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The Lead Ores of Southwestern Missouri.

BY C. V. PETRAEUS† AND W. GEO. WARING.*

The lead ore of southwestern Missouri, and the adjoining area in the vicinity of Galena, Kan., is obtained as a by-product of zinc mining, the galena being separated from the blende in the jigging process. Formerly the galena (together with "drybone," including cerussite and anglesite) was the principal ore mined from surface deposits in clay, the blende being the subsidiary product. In the deeper workings blende was found to largely predominate; this is shown by the shipments of the district in 1904, which amounted to 267,297 tons of zinc concentrate and 34,533 tons of lead concentrate.

The lead occurs in segregated cubes, from less than one millimeter up to one foot in diameter. The cleavage is perfect, so that each piece of ore when struck with a hammer breaks up into smaller perfect cubes. In this respect the ore differs from the galena encountered in the Rocky Mountain regions, where torsional or shearing strains seem in most instances to have destroyed the perfect cleavage of the minerals subsequent to their original deposition. Cases of schistose and twisted structure occur in lead deposits of the Joplin district but rarely, and they are always quite local.

The separation of the galena from the blende and marcasite ("mundic") in the ordinary process of jigging is very complete; the percentage of zinc and iron in the lead concentrate is insignificant. As an illustration of this, the assays of 100 recent consecutive shipments of lead ore from the district, taken at random, are cited as follows:

7 shipments assayed from	57 to 70%	lead
15 shipments assayed from	70 to 75%	lead
46 shipments assayed from	75 to 80%	lead
32 shipments assayed from	80 to 84.4%	lead
Average of 100 shipments.....	78.4%	lead

Fourteen shipment samples, ranging from 70% to 84.4% lead, were tested for zinc and iron. These averaged 2.24% Fe and 1.78% Zn, the highest zinc content being 4.5%. No bismuth or arsenic, and only very minute traces of antimony have ever been found in these ores. They contain only about 0.0005% of silver (one-seventh of an ounce per ton) and scarcely more than that of copper (occurring as chalcopyrite).

The pig lead produced from these ores is therefore very pure, soft and uniform in quality, so that the term "soft Missouri lead" has become a synonym for excellence in the manufacture of lead alloys and products, such as litharge, red and white lead and orange mineral. Its freedom from bismuth, which is generally present in Colorado lead, makes it particularly suitable for white lead; also for glass-maker's litharge and red lead. These oxides, for use in making crystal glass, must be made by double refining so as to remove even the small quantities of silver and copper that are present. The resulting product, made from soft Missouri lead, is far superior to any refined lead produced anywhere in this country or in Europe, even excelling the famous Tarnowitz lead. It gives a luster and clarity to the glass that no other lead will produce. Lead from southeastern Missouri, Kentucky, Illinois, Iowa and Wisconsin yields identical results, but the refining is more difficult, not only because the lead contains a little more silver and copper but also because it contains more antimony.

The valuation of the lead concentrate produced in the Joplin district is based upon a wet assay, usually the molybdate or ferrocyanide method. The price paid is determined variously. One buyer pays a fixed price for average ore, making no deductions; as, for example, at present rates, $32.25 per 1,000 lb. whether the ore assays 75% or 84% Pb, pig lead being worth $4.75 at St. Louis.[1] Another pays $32.25 for 80% ore, or over, deducting 50c. per unit for ores assaying under 80%. Another pays for 90% of the lead content of the ore as shown by the assay, at the St. Louis price of pig lead, less a smelting charge of, say, $6 to $8 per ton of ore.

The history of the development of lead ore buying in the Joplin district is rather curious. In the early days of the district the ore was smelted wholly on Scotch hearths, which, with the purest ores, would yield 70% metallic lead. No account was taken of the lead in the rich slag, chemical determinations being something unknown in the district at that time; it being supposed generally that pure galena contained 700 lb. lead to the 1,000 lb. of ore, the value of 700 lb. lead, less $4.50 per 1,000 lb. of ore for freight and smelting costs, was returned to the miner. The buyers graded the ore, according to their judgment by its appearance, as to its purity and also as to its behavior in smelting; an ore, for example, from near the surface, imbedded in the clay and coated more or less with sulphate, yielded its metal more freely than the purer galenas from deeper workings.

This was the origin of the present method of buying—a system that would hardly be tolerated except for the fact that the lead is, as previously stated, considered a by-product of zinc mining.

Originally all the lead ore from the Missouri-Kansas district was smelted in the same region, either in the air furnace (reverberatory sweating-furnace) or in the water-back Scotch hearth. Competition gradually developed in the market. Lead refiners found the pure sulphide of special value in the production of oxidized products. Some of the ore found its way to St. Louis, and even as far away as Colorado, where it was used to collect silver. Since the formation of the American Smelting & Refining Co. and the greatly increased output of the immense deposits of lead ore in Idaho, no Missouri lead ore has gone to Colorado.

Up to 1901, one concern had more or less the control of the southwestern Missouri ores. At the present time, lead ore is bought for smelters in Joplin, Carterville and Granby, Mo., Galena, Kan., and Collinsville, Ill., and complaint is heard that present prices are really too high for the comfort of the smelters. Yet the old principle of paying for lead ores upon the supposed yield of 70%, irrespective of the real lead content, is still largely in vogue, notwithstanding the temptation that this system might afford to mix flint tailings with the cleaned lead, a practice which, if indulged in, must work doubly hard upon the smelters, causing additional smelting costs and losses in slag.

Anyone interested in the matter will find it quite instructive to calculate the returning charges, or gross profits, in smelting these ores, on the basis of 70% recovery, at $32.25 per 1,000 lb. of ore, less 50c. per ton haulage, with lead at $4.77 per 100 lb. at St. Louis. No deduction, it should be remarked, is ever made for moisture in lead ores in this district. It is of interest to observe that Dr. Isaac A. Hourwich estimates (in the U. S. Census Special Report on Mines and Quarries recently issued) the average lead contents of the soft lead ores of Missouri in 1902 at 68.2%, taking as a basis the returns from five leading mining and smelting companies of Missouri, which reported a product of 70,491 tons of lead from 103,428 tons of their own and purchased ore. The average prices for lead ore in 1902 were reported as follows, per 1,000 lb.: Illinois, $19.53; Iowa, $24.48; Kansas, $23.51; Missouri, $22.17; Wisconsin, $23.29; Rocky Mountain and Atlantic Coast States, $10.90. In 1903, according to Ingalls (*Mineral Industry*, Vol. XII) the ore from the Joplin district commanded an average price of $53 per 2,000 lb., while the average in the southeastern district was $46.81.

V. Laurent, in French patent, No. 352,430, March 16, 1905, describes a process in which the acid liquors obtained in the distillation of wood, are saturated with carbonate or oxide ores to form acetates. In the case of copper and silver acetates being obtained, these are distilled at about or under 300° C., to obtain crystallizable acetic acid, and a residue of the metals. Lead, zinc and nickel acetates thus produced are transformed into carbonates by an alkali carbonate, and the alkali acetate formed is treated by suitable means to recover acetic acid.

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[1] The manuscript of this article was dated Oct. 5, 1905.

Blast-Furnace Gases.*

BY JOHN HERMAN.†

The composition of furnace gases varies greatly under differing conditions. Statements have been made that there is practically no free oxygen in the blast-furnace gases, but I find that this is true only when the gases have passed through comparatively porous charges or where a high column of ore is run in the furnace.

I have made analyses and calculated fuel and blast in furnaces of the Detroit Copper Co., at Morenci, Arizona, the Copper Queen smelter at Douglas, and the Old Dominion Copper Co., at Globe, Arizona, as well as at other places.

At Morenci only 60% of the oxygen blown in at the furnace is consumed. Here there is a large percentage of fines in the charge, the ore crumbles, and a large percentage of sulphide concentrate is smelted. As a result, the blast comes through spots in the compact charge, and through heavy cellular accretions next to the water-jackets. Much of the air blown through holes and accretions does not come in contact with fuel or ore, and is not even heated to any considerable extent. Portions of the charge are not penetrated by the blast, and here considerable carbon monoxide is formed. This diluted carbon monoxide does not burn with the oxygen at the temperature of the gases above the charge, and the gases show both free oxygen and carbon monoxide.

A column about 8 ft. high is usually run, since a higher column causes the ore to crumble and pack, besides causing the coke to be burned before it gets near the tuyeres. The furnace is boshed considerably, and difficulty is experienced with wall accretions. A heavy accretion is annoying, although it saves jacket-water, and heat as well, by insulating the water-jackets. The fuel on the charge is equivalent to 10.6% of fixed carbon.

Analyses of the gases above the charge showed great variations and apparent discrepancies. These discrepancies were due to the difference between the charges as calculated and the actual material fed into the furnace at different moments, as well as the differences in the amounts of sulphur burned and limestone decomposed at different periods.

Whenever assays are taken above the top of the charge the gases will be found diluted with outside air; this is true even when ordinary furnace doors at the feed floor are closed.

In order to find the composition of the gases from an entire furnace, it is necessary to know the amount of carbon and sulphur burned, and the composition of the furnace charge as well as the analyses of the gases in the flue. From these data the composition of the gases passing from the furnace can be determined.

Free air usually passes up the sides of the furnace next to the jackets.

If the temperature of the gases is to be determined, an allowance must be made for the dilution with outside air, and the amount of moisture in the gases should not be forgotten when figuring on the lowering of the temperature by a given weight of air.

The composition, by volume, of furnace gases, exclusive of moisture, is as follows: CO_2 from carbon, 8.3%; CO_2 from limestone, 2.6%; SO_2, 2.5; CO, 2.15%; O, 8.00%. It will be noticed that 20% of the carbon is burned to carbon monoxide.

The average temperature of the entire amount of gas at the top of the charge is about 840° F. The temperature in the flue, with doors open, is about 400° F.

At Douglas, Arizona, nearly double the quantity of air, theoretically required, is blown through the furnaces, and the gases contain 10% of free oxygen. The charges here resemble those at Morenci, in the crumbly nature of the charge and the concentrates smelted. Here, however, the ores are bedded before feeding to the furnace, thus securing a more uniform mixture and a much better distribution of blast. As a result, there is no carbon monoxide in the gases. A ten-foot column is carried above the tuyeres; the furnaces are very slightly boshed, and there are practically no furnace accretions, though more heat is lost to the water-jackets than at Morenci. The amount of fixed carbon on the charge is 11.6 per cent.

The conditions at the Calumet & Arizona smelter, at Douglas, are nearly the same as at the Copper Queen, but the ores are not bedded and about 8% of the carbon is burned to carbon monoxide.

At the Old Dominion smelter, at Globe, Arizona, the conditions for good metallurgical work are excellent, and practically all the air blown through the furnaces is used for combustion. Here they smelt about eight tons of ore per square foot of area at the tuyeres. The charge is very open and the blast can go through the entire furnace. The furnaces have a bosh of only seven-eighths of an inch to the foot for the entire height. A 9-ft. column of ore is run and an average of 10% of fixed carbon is used on the charge. Furnace accretions seldom form.

All the conditions at Globe cause the gases at the top of the charge to have a high temperature, though the losses in heating jacket water are small. The following is the average composition of the gases: CO_2 due to fuel, 14.1%; CO_2 due to limestone, 3.1%; SO_2, 3.5%; CO, 3.2%. The average temperature is between 1,100 and 1,200° F. On an average 18½% of the carbon is burned to carbon monoxide. The loss in heating the entire amount of furnace gases and moisture at Globe, plus the heat lost by the incomplete burning of carbon, is equivalent to 5% of carbon burned on the charge or 50% of the total amount of fuel added.

The presence or absence of moisture, under the conditions, seems to have very little effect on the running of the furnaces. The escaping gases are simply made to give up part of their heat in driving off the water in the charge. This would not be the case in the ordinary lead furnaces where the escaping gases are at about the temperature of boiling water.

At Morenci and Douglas about 70% of the sulphur is burned, and at Globe 65%. The large tuyeres, set close together, are a factor in the large amount of sulphur burned.

The blast burns anything that is combustible in its path, without having much selective action between carbon and sulphur. Smaller tuyeres would force the blast through the charge, and more selective action would take place. The burning of a large percentage of sulphur is desirable at most places, though at Globe it is the reverse, because sulphides have to be imported from Bisbee in order to make matte in place of black copper.

To use smaller tuyeres at Globe would mean either greatly increased blast pressure (and therefore more power for the same tonnage), or else a slower runing of the furnaces, which would offset the advantages.

It is worthy of note that with a definite amount of blast the greatest tonnages per day were produced at Globe when it was possible to use a small percentage of fuel on the charge. It is evident that a definite amount of blast can burn only a definite amount of coke and pyrites, and that any excess of fuel means less ore smelted per day. An excess of coke will make hotter slag, but it will throw a very high percentage of heat into the gases and will also delay the charge. The greater the amount of gases in proportion to the ore, the smaller is the percentage of total heat that can be taken up by the ore. With an extra amount of coke on the charge, I have seen the gases so hot that the diluted carbon monoxide would burn above the top of the charge.

*A paper in *Western Chemist and Metallurgist*, June, 1905, I, v, 145-148.

†Globe, Arizona.

J. N. Raffard, in the *Revue de Mechanique* (May 31, 1905) says that catgut belting will work effectively under a tension of nearly 4,300 lb. per sq. in., or ten times the allowable loads for leather belts. On this basis, a cord of catgut, 0.39 in. diameter, should do the work of a leather belt 6 in. wide and 1-5 inch thick. It should be used in endless form, as belt or screw fasteners of any kind cause a serious loss of strength. Of course, objections to the general use of catgut belting are its cost and the small sizes in which is available. Its principal use, in this country, is in driving light lathes, such as those used in making instruments of precision.

The Dodd Buddle.*

BY GEO. ATTWOOD.

The Dodd buddle is comparatively a new machine. It is a circular table, 10 ft. in diameter, constructed of wood, and mounted on a spider-frame supported by a central bearing running on balls in an oil-chamber, see Fig. 1. Its surface has a slight incline from the center to the edge, and is covered with linoleum, upon which are nailed the riffles, of varying lengths. The height of the cone is adjusted to suit the particular ore which is being worked, by means of the hand-wheel and screw shown in the center of the illustration. The motion of the table is similar to that of a miner's hand-pan, and is imparted to the machine by means of the driving-mechanism shown.

The working of the pulp brings the sulphurets along to the smooth surface of the table, and the separation is made in several little ribbons of sulphurets of different degrees of cleanness. The point can be moved to suit these ribbons of concentrates, dividing them into first quality, second quality, and middling. The middling can either be returned to the table by means of a sand-pump, or it can be led to another machine to be treated separately. The latter generally proves the more satisfactory method. The feed-box is shown at the center of the table, but with some ores it is found necessary to extend it toward the head-gear, distributing the pulp at the head of the riffles. The small channel-bar trough shown in Fig. 2 was at first employed in elevating the middling to the table again, but the sand-pump has been found superior for this purpose. The water is fed through a pipe laid in a curve from the edge of the table, past and around the center, and fitted with a number of pet-cocks by which the quantity may be regulated to suit the pulp (see Fig. 2). The tailing which runs over the riffles into the trough, runs along it, and is discharged at a central point on the opposite edge from the head-gear. At this point it is advisable to have an automatic tailing sampler, so that the exact results may be determined regularly.

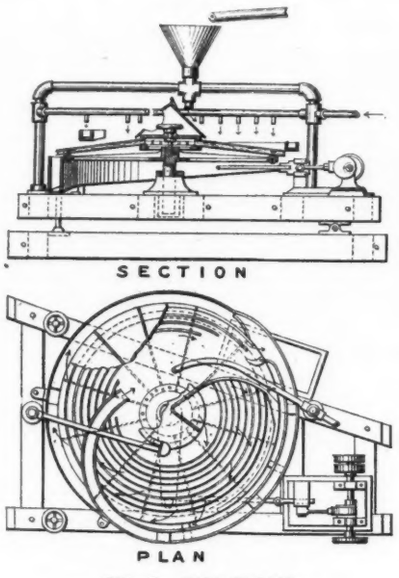


FIG. 1. DODD BUDDLE.

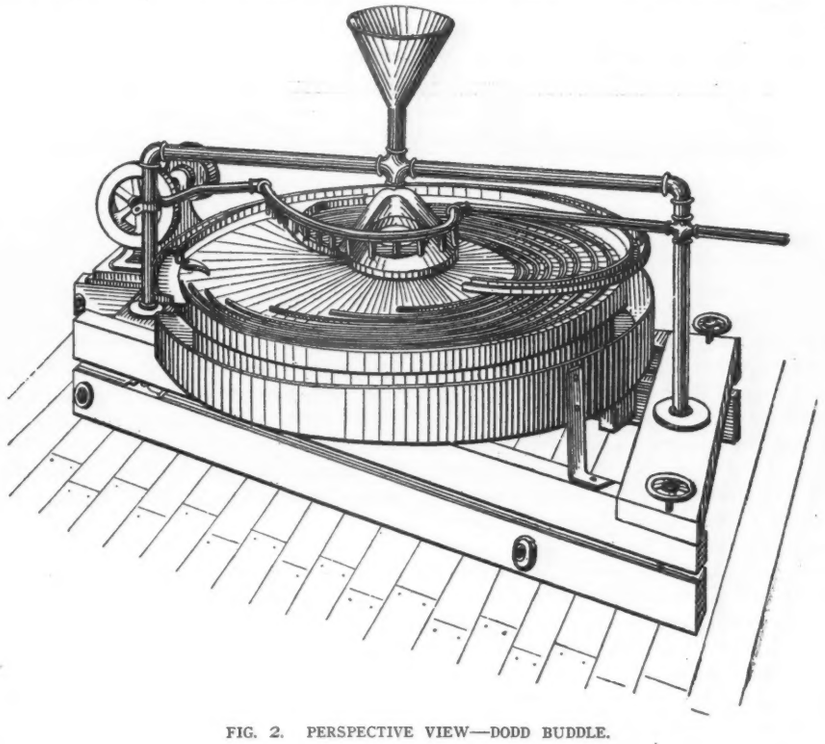


FIG. 2. PERSPECTIVE VIEW—DODD BUDDLE.

The action of the machine is described by the inventor as follows: "As the table consists of a frustum of a cone which is given a differential oscillating motion about the center spindle upon which it is supported, and as the feed is upon the cone near its center, the pulp in its travel to the periphery of the table is afforded agitation varying from an extremely slight motion near the feed to a maximum of about 1.5 in. at the periphery. Sulphurets of all degrees of fineness and specific gravities will settle behind the riffle at a point on the table where the oscillating motion overcomes the force of the natural flow of the pulp. The travel of the pulp on the table approximates an involute curve, being the resultant of a natural flow down an incline plane and the oscillating impulses given the table. The angle of separation of the sulphurets and gangue, therefore, is the difference between the involute curve and the arc of the circle. This is extremely acute at first and gradually gets more obtuse as the pulp travels down, effecting a separation without causing any disturbance to the mineral collection held within the grooves formed by the riffle and making it possible to save the finest sulphurets."

The table is in use at the mill of the Silver Cup mine, British Columbia.

*Notes from a paper in *Proceedings* of the Institution of Civil Engineers, 1905, CLIX.

Gold Mining in Japan.

The law passed by the Japanese Parliament last July, which empowered and invited the Land Bank to make advances to the proprietors of mines at moderate rates of interest, not exceeding 8% per annum, is proving effective. According to the Belgian *Moniteur des Intérêts Materiels,* advantage has already been taken of the new legislation; when fully applied, it is estimated that this will increase the annual output of gold and silver by about 5,000,000 yen. It was really the outbreak of the war with Russia which moved the Government to turn its serious attention to the matter; and during 1904 the annual output was increased 50%. The advances of the Land Bank are made upon the advice of a committee, which inquires into the organization of each mine, the quality of its output, etc.; the capital advanced is to be returned in yearly payments within a period of 10 years, the Bank of Japan (acting on the advice of the Imperial Mint) buying up the gold and silver produced. The mines in Formosa are also increasing their production every year; while as to Korea, the Osaka Mint is already actively buying up Korean gold dust; when modern methods shall have been introduced for the exploitation of the goldfields, this country also may take an important position as a gold producer.

For the twelve months ending February, 1905, the output of the gold mines in Japan amounted to 9,000,000 yen. The goldfields in Formosa yielded 3,000,000 yen—making the total yield from Japanese territory 12,000,000 yen (about $6,000,000).

Repairing Partly Collapsed Cylindrical Furnaces.*

BY JOHN P. COSGRO†

The increasing use of internal furnace-boilers for mining power-plants (doubtless due to the facility with which they may be installed by reason of their portability; the fact that they require no masonry setting, cast-iron fronts, buck-stays, etc., and practically no foundation; and the successful maintenance of their claim to equal and even superior economy, as compared with boilers of other types) warrants this description of a method of remedying an injury which may occur, to such a furnace, even though it satisfies the requirements of the formula adopted by the United States Board of Supervising Inspectors of Steam Vessels.[1] I refer to the sagging and deformation which may result from overloading the boilers for a considerable period—say, several days. This is sometimes unavoidable under the exacting conditions of continuous day-and-night service, and (in spite of all rules and precautions) the occasional careless or unskillful work of attendants. Such a trouble is by no means unknown on shipboard, where this type of boiler is so largely employed.

In the case here described, two Morrison suspension-furnaces, of ½-in. steel, 14 ft. long and 45 in. in mean diameter, with "dry-back" boilers, were necessarily operated somewhat beyond their rated normal capacity for several months, while a third similar unit was in process of installation, and during this period, though the boilers were kept perfectly clean, heat seems to have been generated slightly faster than it was absorbed by the water in the boilers. The corrugations of this type of furnace have the form of a catenary, with 8-in. span and a versed sine of 1.5 in.; and, as a result of the abnormal strain above described, the furnaces had partly collapsed, or dropped a total distance of 1 3-16 in. As would be expected, the greatest deformation was just back of the bridge-wall; and since external pressure always tends to increase greatly the least departure from a true cylindrical cross-section, forcing it to become more and more elliptical, and finally to collapse and fall, it was advisable to correct immediately the change already effected, by restoring the original form of the furnaces.

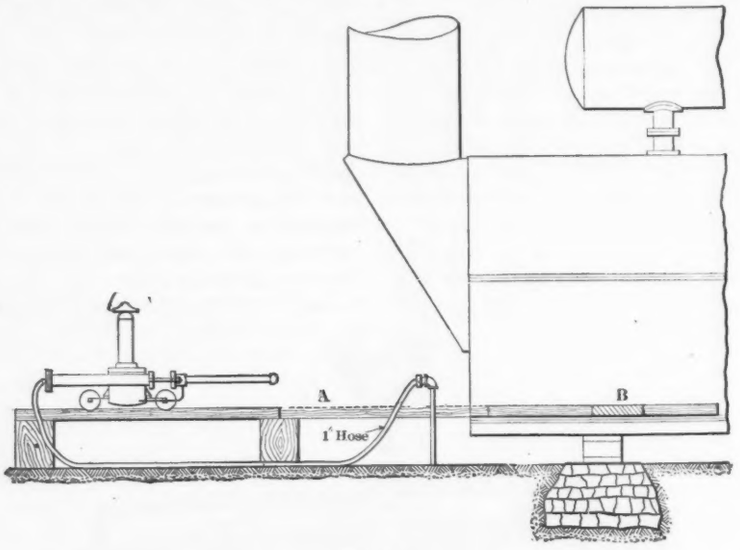


FIG. 1.

The work was done successfully by means of a simple hydraulic press, designed for the purpose, of which Fig. 3 and 4 are cross-sections, Fig. 2 a right-line drawing prepared from a photograph, and Fig. 1 a sketch showing the general arrangement and method of operation.

A natural hydrostatic pressure of about 250 lb. per sq. in. was available from a tank on a hill several hundred feet above the boiler-house, through the pipe line of the general fire- and water-service. Using this pressure direct, we obtained by means of the 10⅛-in. lifting-cylinder, *L*, Fig. 3, a lifting-force of 10 tons at the pressure-head, B_1. No data being obtainable as to the force necessary to press up the dropped crowns, the required lifting-capacity was largely a matter of judgment. A capacity of 50 tons was provided; all of which was in fact required in re-shaping the furnaces.

A piece of new 1-in. air-hose was connected from the pipe-line to the pressure-head, as shown in Fig. 1, and gave satisfactory results, bearing 250 lb. without showing any signs of distress. It could not be expected, however, to stand the pressure necessary for a lifting-effort of 50 tons; hence an intensifier with a low-pressure plunger 4⅛ in. in diameter, a high-pressure plunger 1 13-16 in. in diameter, and a 24-in. stroke, was mounted on the press itself, with its center of gravity over the longitudinal center of the press, and connected to the lifting side of *L* by the high-pressure pipe *H*.

By calculation based upon the data given, it will be found that the delivery pressure due to intensifying was

$$\frac{\text{Area of low-pressure cylinder}}{\text{Area of high-pressure cylinder}} \times 250 \text{ (the line-pressure)} =$$

1,300 lb. per sq. in., and that the displacement of the high-pressure cylinder per stroke was the area of that cylinder × 24 = 61.9 cu. in. Hence the intensifier would lift the ram a distance of 0.75 in., and exert a force of 52 tons, neglecting friction, weight of ram, etc.

The idle part of the stroke being effected and all slack taken up by the line pressure, practically all of the high-pressure ram movement could be utilized for pressing up the crown.

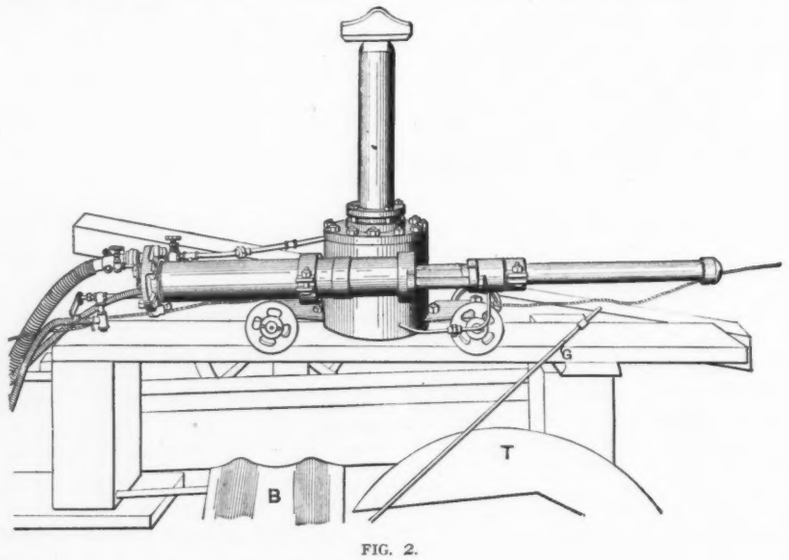


FIG. 2.

*Abstract of a paper read at the Washington meeting of the Am. Inst. of Min. Eng., May, 1905.

†Master mechanic, War Eagle Mining & Development Co., Ltd., Rossland, B. C., Canada.

[1] This formula is $P = \frac{15000}{D} \times T$, in which T is the thickess of furnace in inches; P, working-pressure in pounds per sq. in.; 15,000, a constant; and D = mean diameter (least inside diameter, plus thickness of metal, plus 1.5 in.).

The mode and sequence of operations were as follows: The part of the furnace where operations were to begin, and at the places shown to be out of round by template, *T*, Fig. 2, were heated to low-red by a wood fire, contained in a sheet-iron pan or basket, fitted with long handles to facilitate its easy handling. Directly under the spot to be pressed up was placed plate *B* (Fig. 1), a casting roughly fitting the corrugations of the furnace. This plate is 12 in. wide and fitted the tread of the truck-wheels on the press.

A short piece (say, 2 ft.) of plank, placed beyond and abutting against the plate, formed an extension-track; and longer pieces similarly laid to connect the plate with the bench, upon which the press is withdrawn and kept out of the way during the heating, made a good track upon which the press could be readily moved in and out of the furnace (see Fig. 4). Plank *A* was taken out of the way when not in use.

When the ram was in its lowest position, as shown in Fig. 3 and 4, the plate *B*, which was set in a ball-and-socket seat, and held in place by a loosely-fitting dowel-pin, had 2 in. clearance from the top of the furnace.

When a long low heat had been secured the fire-basket was taken out, and the plank *A* put in the furnace. The press was then put into place with the cylinder over the plate *B*, and pressure was admitted through the 0.25-in. globe-valve *Y* from the pressure-header *O* to the lower end of *L*. This raises the ram and block *B* up against the furnace, and springs *L* down half an inch, when the rounded bottom comes in contact with *B*, from which it had previously been held apart by the spring-plates *S S*.

In filling the lower part of *L*, the water also fills the high-pressure cylinder *D* through *H*, and acting on plunger *P* has sufficient force to drive it back to the position shown in Fig. 3.

When the pressure-block is hard up in place, water is admitted from *O* to low-pressure cylinder *R* through valve *W*, which advances the plunger *P* in *D*, forcing the water back through *H* to *L*; escape through the admission-pipe being prevented by a check-valve placed between the admission-valve and cylinder. The pressure in *L* is now 1,300 lb., or a total lifting-effect of 52 tons on a 10⅞-in. piston.

As soon as the plunger *P* reaches the end of its stroke, valve *W* is closed and valve *X* is opened, when the lime-water coming into *L*, through admission-pipe and again filling *D*, forces *P* back to the first position ready for another stroke. This action may be repeated indefinitely, and at each heat two corrugations or about 16 in. are treated.

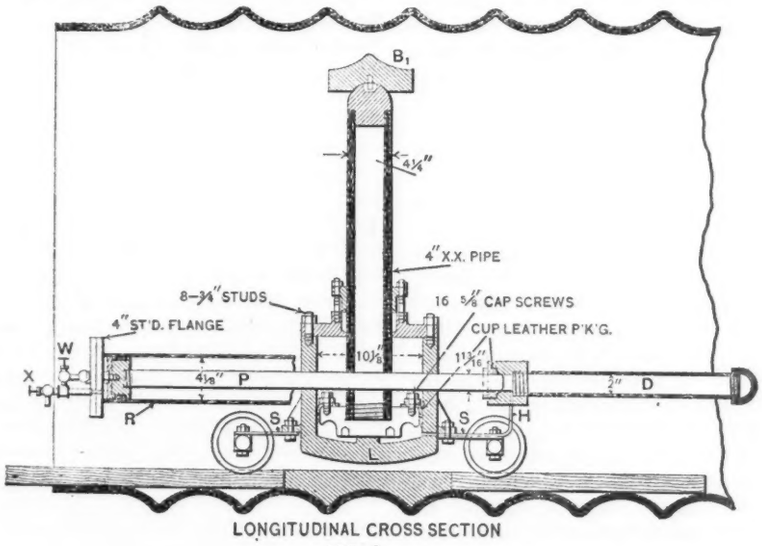
By testing the curvature with template *T*, tilting the press slightly from the vertical when necessary, and by comparing the vertical and the horizontal diameter with the caliper-gauge, the curvature of furnace may be brought up to a practially true circle. The variation certainly need not exceed 1-16 of an inch.

Low first cost being necessary in making this experimental machine, stock on hand was utilized wherever possible. In fact, only the main cylinder, the head and plates *B* (Fig. 1) and B_1 (Fig. 3), together with the two caps for the intensifier, were purchased—in all, about 300 lb. of rough castings.

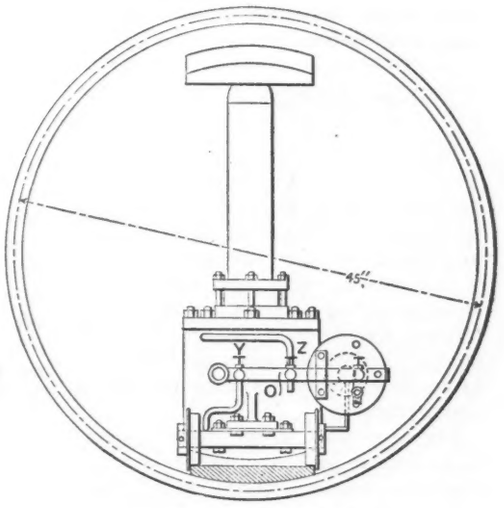
The ram was made of a piece of 4-in. double extra heavy pipe—in size sometimes used in the mine for column-bars—turned to 4.25 in. in diameter. Cylinder *D* is a piece of 2-in. standard brass pipe specially threaded with 15 threads to the inch at each end. Cylinder *R* is simply a piece of 4-in. standard iron pipe, bored with one cut to 4⅛ in., fitted with a piston from an old 6 by 4 by 6 in. duplex pump screwed on to a piece of 1⅞-in. diamond-drill tubing, turned down to 1 13-16 in. and plugged, forming the plunger *P*. Standard 0.25-in. globe and angle valves were used for controlling admission and exhaust, and 0.25-in. standard iron pipe for all cylinder connections, except for *H*, which is ⅛ in. standard. It is pressing the limit somewhat to put 1,300 lb. pressure on 0.25 in. standard pipe, but, as it stood up to the work, it shows what may be done under stress of circumstances. Single-cup leather packing of the usual form was used on the lifting and intensifier plungers. The cost of the press, figuring material and labor at cost, was $67.

All the work of building a press of this kind may be readily handled in any mine machine shop equipped with a drill-press and a lathe capable of swinging 18 in. or more. The patterns were made by a mine carpenter having no knowledge of pattern-making.

The entire cost of repairing the two furnaces, including dismantling and refitting, cost of press, but not the superintendence, was $187. The time taken for the work was eight days.



LONGITUDINAL CROSS SECTION
FIG. 3.



TRANSVERSE CROSS SECTION
FIG. 4.

This cost was not considered excessive, in view of the fact that a pair of new furnaces would have cost $700 each, delivered at Rossland, to say nothing of the expense involved in changing the furnaces, and remembering that, unless replaced or repaired, the old ones were not considered safe at the steam-pressure necessary for the economical operation of the engines. The cost is much less, and the operation more satisfactory than that of a hydraulic jack to do the same work.

As a hydrostatic head of any considerable force is frequently not available, a small boiler-feed or tank pump might be utilized to furnish the necessary pressure, or by rigging up a temporary accumulator, a hand force-pump could be used.

A somewhat lower water pressure could be employed by increasing the size of the main cylinder, but, if this be carried to extreme, it would sacrifice mobility and ease of operation, two very essential fea-

tures when a hot furnace is ready to be repaired. An oil-burner could be used to excellent advantage to take the heats if the price of fuel-oil permits.

In order to insure against oversetting (an advisable precaution if inexperienced help is to be employed), a hole may be drilled in the main-cylinder wall at such a height that it will be uncovered and release the pressure when the piston has risen a proper distance. The intensifier is clamped to the main cylinder by two straps of 2 by ⅝-in. iron bolted to pads, cast on the side of the cylinder for the purpose.

Furnaces should be tested with template *T*, in order to determine at what points the collapse has started and the heat should then be taken at the points indicated. In every case the action of the press will be in a nearly vertical direction, the heat being taken at the place of deformation allowing correction at these points.

After having been in service for 14 months from the time the above repairs were made, the furnaces were calipered and found practically perfect.

Lime Roasting of Galena.

BY W. MAYNARD HUTCHINGS.

Much interest attaches to the paper by Prof. Borchers, recently presented in this JOURNAL (Sept. 2, 1905) on "New methods of desulphurizing galena," together with an editorial on "Lime roasting of galena"; it is a curious coincidence that the same issue contained also an article on the "Newer treatment of Broken Hill sulphides," in which is shown the importance of the new methods as a contribution to actual practice.

For some years it have been a source of surprise to me that a new process, so interesting and so successful as the Huntington-Heberlein treatment of sulphide ores, should have received scarcely any notice or discussion. This lack, however, now appears to be remedied. The suggestion that the subject should be discussed in this JOURNAL is good, as is also that of the designation "Lime Roasting," for a type-name. Such observations and experiments on the subject as I have had occasion to record, for many years have figured in my note-books under that heading.

The subject is now well recognized as being worthy of attention, and it is to be hoped that many of our specialists will find ample time and means for investigation of the various reactions concerned.

Whatever may be the final results of the later processes, now before the metallurgical world or still to come, there can be no doubt whatever that full and exclusive credit must be given to Huntington and Herberlein, not only for first drawing attention to the use of lime, but also for working out and introducing practically the process. It has been a success from the first; and so far as part of it is concerned, it seems to be an absolute and fundamental necessity which later inventors can neither better nor set aside. The other processes, since patented, however good they may be, are simply grafts on this parent stem.

It is, however, quite certain that Huntington and Heberlein, in the theoretical explanation of the process, failed to understand the most important reactions. Their attributing the effect to the formation and action of calcium peroxide affords a sad case of *a priori* assumption devoid of any shred of evidence. As Prof. Borchers points out, calcium peroxide, so difficult to produce and so unstable when formed, is an absolute and absurd impossibility under the conditions in question. Probably many rubbed their eyes with astonishment on reading that part of the patent on its first appearance, and hastened to look up the chemical authorities to refresh their minds, lest something might have escaped them as to the nature of calcium peroxide.

Fortunately the patent law is such that there was no danger of a really good and sound invention being invalidated by a wrong theoretical explanation by its originators. But, nevertheless, it was a misfortune that the inventors did not understand their own process. Had they known, they could have added a few more words to their patent-claims and rendered the Carmichael patent an impossibility.

Prof. Borchers appears to consider that the active agent in the new process is calcium plumbate. That this compound may play a part at some stage of the process may be true; this long ago suggested itself to some others. We may yet expect to hear that the experiments undertaken by Prof. Borchers himself, and by others at his instigation (in which calcium plumbate is separately prepared and then brought into action with lead sulphide) have given good results. But it does not appear so far that there is any real proof that calcium plumbate is formed in the Huntington-Heberlein or other similar processes; and it is difficult to see at what stage or how it would be produced under the conditions in question. This is a point which research may clear up, but it should not be taken for granted at this stage. Indeed, it seems to me, that the results obtained may be fairly well explained without calling calcium plumbate into play at all.

Of course the action of lime in contact with lead sulphide excited interest many years before the new process came into existence. My own attention to it dates back more than a dozen years before that time (I was in charge of works where I found the old "Flintshire process" still in use).

Percy pointed out, in his work on lead smelting, that on the addition of slacked lime to the charge, at certain stages, to "stiffen it up," the mixture could be seen to "glow" for a time. When I myself saw this phenomenon, I commenced to make some observations and experiments. Also (as others probably had done), I had observed that charges of lead with calcareous gangue are roasted more rapidly and better than others, and to an extent which could not be wholly explained by simple physical action of the lime present.

Simple experiments made in assay-scorifiers in a muffle, on lime roasting, are very striking, and I think quite explain a good part of what takes place up to a certain stage in the processes now under consideration. I tried them many years ago, on many sorts of ore, and again more recently, when studying the working of the new patents. For illustration, I will take one class of ore (Broken Hill concentrate), using a sample assaying: Pb, 58%; Fe, 3.6%; S, 14.6%; SiO_2, 3%. The ore contained some pyrite. If two scorifiers are charged, one with the finely powdered ore alone, and one with the ore intimately mixed with, say 10% of pure lime, and placed side by side just within a muffle at low redness, the limed charge will soon be seen to "glow." Before the simple ore charge shows any sign of action, the limed charge rapidly ignites all over, like so much tinder, and heats up considerably above the surrounding temperature, at the same time increasing considerably in bulk. This lasts for some time, during which hardly any SO_2 passes off. After the violent glowing is over, the charge continues to calcine quietly, giving off SO_2, but is still far more active than its neighbor. If, finally, the fully roasted charge is taken out, cooled and rubbed down, it proves to contain no free lime at all, but large quantities of calcium sulphate can be dissolved out by boiling in distilled water. For instance, in one example where weighed quantities were taken of lime and the ore mentioned, the final roasted material was shown to contain nearly 23% of $CaSO_4$; the quantity actually extracted of water was 20.2%. Further tests show that the insoluble portion still contains calcium sulphate intimately combined with lead sulphate, but not extractable by water.

There is no doubt that when lead sulphide (or other sulphide) is heated with lime, with free access of air, the lime is rapidly and completely converted into sulphate. The strong base, lime, apparently plays the part of "catalyzer" in the most vigorous manner, the first SO_2 evolved being instantly oxidized and combined with the lime to sulphate, with so strong an evolution of heat that the operation spreads rapidly and still goes on energetically, even if the scorifier is taken out of the muffle. Also, the "catalytic" action starts the ozidation of the sulphides at a far lower temperature than is required when they are roasted alone.

If, in place of lime, we take an equivalent weight of pure calcium carbonate and intimately mix it with ore, we obtain

just the same action, only it takes a little longer to start it. Once started, it is almost as vigorous and rapid, and with the same results. It does not seem correct to assume (as is usually done) that the carbonate has first to be decomposed by heat, the lime then coming into action. The reaction commences in so short a time and while the charge is still so cool, that no appreciable driving off of CO_2 by heat only can have taken place. The main liberation of the CO_2 occurs during the vigorous exothermic oxidation of the mixture, and is coincident with the conversion of the CaO into $CaSO_4$.

If, in place of lime or its carbonate, we use a corresponding quantity of pure calcium sulphate and mix it with the ore, we see very energetic roasting in this case also with copious evolution of sulphur-dioxide, only it is much more energetic and rapid and occurs at a lower temperature than in the case of a companion charge of ore alone.

It is very easily demonstrated that the $CaSO_4$ in contact with the still unoxidized ore (whether it has been introduced ready made or has been formed from lime or limestone added) greatly assists the further roasting, in acting as a "carrier" and enabling calcination to take place more rapidly and easily and at a lower temperature than would otherwise be the case.

The result of these experiments (whether we mix the ore with CaO, $CaCO_3$ or $CaSO_4$) is that we arrive with great ease and rapidity at a nearly dead-sweet roast. The lime is converted into sulphate, and the lead partly to sulphate and partly to oxide. Two examples out of several, both from the above ore, gave results as follows:

No. 1—Roasted with 20% $CaCO_3$ (= 11.2% CaO); sulphide sulphur, 0.02%; sulphate sulphur, 9.30%; total sulphur, 9.32%.

No. 8—Roasted with 27.2% $CaSO_4$ (= 11.% CaO); sulphide sulphur, 0.05%; sulphate sulphur, 11.28%; total sulphur, 11.33%.

If these calcined products are now intimately mixed with additional silica (in about the proportions used in the Huntington-Heberlein process) and strongly heated, fritting is brought about and the sulphur content is reduced by the decomposition of the sulphates by the silica. Thus, the resultant material of experiment No. 1, above, when treated in this manner with strong heat for three hours, was sintered to a mass which was quite hard and stony when cold, and which contained 6.75% of total sulphur. Longer heating drives out more sulphur, but a very long time is required; in furnaces, and on a large scale, it is with great difficulty and cost that a product can be obtained comparable with that which is rapidly and cheaply turned out from the "converters" of the new process.

To return to the Huntington-Heberlein process, working, for example, on an ore more or less like the one given above, we may assume that, during the comparatively short preliminary roast, the lime is all rapidly converted into $CaSO_4$ and that some $PbSO_4$ is also formed (but not much, as the mixture to be transferred from the furnace to the converter requires not less than 6 to 8% of sulphur to be still present as sulphide, in order that the following operation may work at its best). As the blast permeates the mass, oxidation is energetic; no doubt the $CaSO_4$ here plays a very important part as a carrier of oxygen, in the same manner as we can see it act on a scorifier or on the hearth of a furnace.

What the later reactions are does not seem so clear. They are quite different from those on the scorifier or on the open hearth of a furnace, and result in the rapid formation (in successive layers of the mixture, from the bottom upward) of large amounts of lead oxide, fluxing the silica and other constituents to a more or less slaggy mass, which decomposes the sulphates and takes up the CaO into a complex and easily fused silicate. It is true that, *as a whole*, the contents of a well-worked converter are never very hot, but locally (in the regions where the progressive reaction and decomposition from below upward is going on) the temperature reached is considerable. This formation of lead oxide is so pronounced at times that one may see in the final product considerable quantities of pure uncombined litharge.

When the work is successful, the mass discharged from the converters is a basic silicate of PbO, CaO and oxides of other metals present, and nearly all the sulphates have disappeared. A large piece of yellow product (which was taken from a well-worked converter) contained only 1.1% of total sulphur.

It may be that calcium plumbate is formed and plays a part in these reactions; but its presence would be difficult to prove, and its formation and existence during these stages would not be easy to explain. Neither does it seem necessary, as the whole thing appears to be capable of explanation without it.

While the mixture in the converter is still dry and loose, energetic oxidation of the sulphides goes on, with the intervention of the $CaSO_4$ as a carrier. As soon as the heat rises sufficiently, fluxing commences in a given layer and sulphates are decomposed. The liberated sulphuric anhydride, at the locally high temperature and under the existing conditions, will act with the greatest possible vigor on the sulphides in the adjacent layers; these layers will then in their turn flux and act on those above them, till the whole charge is worked out. The column of ore is of considerable height, and is under pressure, say, a blast of 1½ lb., or perhaps more, in the larger converters now used. This pressure of the oxidizing blast (and of the far more powerfully oxidizing sulphuric anhydride, continuously being liberated within the mass of ore, locally very hot) constitutes a totally different set of conditions from those obtaining on the hearth of a furnace with the ore in thin layers, where it is neither so hot nor under any pressure. It is to these conditions, in which we have the continued intense action of red-hot sulphuric anhydride under a considerable pressure (together with the earlier action of the $CaSO_4$), that the remarkable efficiency of the process seems to me to be due.

In the Carmichael process, the preliminary roast is done away with, $CaSO_4$ being added direct instead of having to be formed during the operation from CaO and the oxidized sulphur of the ore. The charge in the converter has to be started by heat supplied to it, and the work then goes forward on the same lines as in the Huntington-Heberlein process, so that we may assume that the reactions are the same and come under the same explanation.

Carmichael was quick to see what was really an important part and a correct explanation of the original process. He was not misled by wrong theory about any mythical calcium peroxide, and so he obtained his patent for the use of $CaSO_4$ and the dispensing of the roast in a furnace.

This process would always be limited in its application by the comparative rarity of cheap supplies of gypsum, but it appears to be a great success at Broken Hill; there it is not only of importance in working the leady ores, but also for making sulphuric acid for the new treatment of mixed sulphides by the Delprat and Potter methods. For this purpose, the use of $CaSO_4$ will have the additional advantage that the mixture to be worked in the converter will contain not only the sulphur of the ore, but also that of the added gypsum; on decomposition, it will yield stronger gases for the lead chambers of the acid plant.

Finally comes the Savelsberg patent, which is the simplest of all; not only (like the Carmichael process) avoiding the preliminary roast with its extra plant, but also not requiring the use of ready-made $CaSO_4$, as it uses raw ore and limestone directly in the converter. I have no knowledge as to actual results of this process; and so far as I am aware, nothing on the subject has been published. But Prof. Borchers evidently has some information about it, and regards it as the most successful of the methods of carrying out the new ideas. On the face of it, there seems no reason why it should not attain all the results desired, as the chemical and physical actions of the CaO, and of the $CaSO_4$ formed from it, should come into play in the same manner and in the same order as in the original process; as it is carried out in the identical converter used by Huntington and Heberlein, the final reactions (as suggested above) will take place under the same conditions as to continuous decomposition *under*

considerable heat and pressure, which I regard as the most vital part of the whole matter.

It is well to emphasize again the fact that the idea, and the means of obtaining these vital conditions, owe their origination to Huntington and Heberlein.

A Peculiar Copper Ore Specimen.

Allan Gibb, manager of the O. K. copper mine, North Queensland, reports having received recently a peculiar copper ore specimen from the Cloncurry copperfield. The ore assayed nearly 50% copper, but gave so little evidence of the presence of the metal that the prospector who found it considered it valueless iron pyrite. The freshly broken specimen had a pale yellow color, and exhibited the general appearance of a cupreous iron pyrite, with less than 12% copper. The specimen assayed 49.7% copper, 22.4% iron and 27.6% sulphur. The microscope disclosed small fragments of copper pyrite set in an iron-gray network, apparently composed of copper glance. The copper pyrite being bright yellow and the glance a steel-gray, the resultant color of the macro-specimen was pale yellow, like that of cupreous iron pyrite. The proportions of glance and pyrite appeared under the microscope to be about one part of the former and two parts of the latter. A polished slice of the specimen showed that the copper pyrite was chiefly in irregular fragments. Some of the fragments exhibited angles varying from 65° to 72°. It is therefore probable that the specimen consisted of copper pyrite with cleavage fissures filled with copper glance.

Chalcopyrite and hematite are associated in a vein at North Yelta, South Australia.

Marble Quarrying at Gouverneur, N. Y.

BY ROBERT B. BRINSMADE.*

One of the most flourishing industries in St. Lawrence county is the quarrying of marble near the village of Gouverneur. Here, the crystallized limestone, which has a wide extension in this region, occurs coarsely crystalline and of dark-gray color in places, very suitable for ornamental and monumental purposes. The limestone stratum lies conformably on gneiss and is topped in spots by an unconformable sandstone stratum of Potsdam age. The limestone is classified in the Oswegatchie series of the Cambrian period, analogous to the Grenville series of Canada. A chemical analysis of a specimen of marble gave 1.58% SiO_2; 0.79% $Fe_2O_3+Al_2O_3$; 51.45% CaO; 3.49% MgO; 0.83% S; 42.56% CO_2. As accessory minerals occur mica, graphite, tourmaline, garnet and pyrite.

The value of the stone depends upon the color (only the dark gray commands a good price for artistic and monumental purposes) and on its freedom from cracks, white streaks and bunches of accessory minerals, locally called knots. When polished, the marble resembles gray granite and resists weathering well. The output, after dressing, sells by the cubic foot and is classified in several grades. The prices at present writing (September, 1905) quoted for stone (cut to dimensions, but not polished) range from $4 for clear dark-gray stone to $1.25 for light-colored building blocks (more or less streaked) f. o. b. Gouverneur.

The marble stratum comes to the surface south and east of the village, and all the quarries are on the outcrop. The companies at present operating are: St. Lawrence Marble Quarries; Gouverneur Marble Co.; Extra Dark Marble Co.; Northern New York Marble Co.; D. J. Whitney Marble Co.; Rylstone Marble Co.; White Crystal Marble Co.; Watertown Marble Company.

Each of the above companies with the exception of the last (whose plant is at Watertown, N. Y.) has a mill adjoining the quarry, varying in size from the 4-gang plant of the Whitney to the 15-gang plant of the Watertown company. The total production in 1904 was of ornamental marble $144,934, and of building stone $37,279.

The ornamental grades of marble occur irregularly. In the St. Lawrence quarry, it is in a stratum 30 ft. wide, between common grades; in the adjoining Extra Dark ground it seems to occur in patches; while the Northern New York and Whitney companies have followed it vertically to considerable depth over an area of as much as an acre.

FIG. 1. RYLSTONE MILL AND QUARRY.

In opening a new quarry, the decomposed stone and loam on the outcrop are first carted away and a water sump is then cut out at about the center of the proposed operations by machine-drill and dynamite. A large crane with wooden post and boom and steel-rod guys (the weights being lifted by a horse whim) is then erected alongside the water sump. A space 60 ft. square, or larger, can then be leveled off on the border of the water sump for the inauguration of channeling.

The channeler used is a No. 6½ Sullivan, set on a portable steel track 30 ft. long, and supplied with steam from the mill boilers through a pipe connected to the channeler by a flexible joint, permit-

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ting the necessary forward-and-backward motion. In channeling, two parallel channels are first driven 60 ft. apart at right angles to the side of the water sump and rising from it, so that the bit cuttings can be washed into the sump. These main channels are then connected by parallel channels 4 ft. 8 in. apart and at right angles to the main ones. These leave the surface blocked out into rectangles 60 ft. long and 4 ft. 8 in. wide. These rectangles are next cut into squares 4 ft. 8 in. on a side by running channels parallel to the two first driven. There is thus produced a series of blocks, 4 ft. 4 in. square, and as deep as the channel, viz. 6 ft.;

Several of the quarries possess diamond-drill channelers, but on account of the high price of diamonds, the machine at the St. Lawrence is the only one now in operation. This is a Sullivan machine, with carriage, portable track and steam-pipe connection as described for the percussion channeler. It has two diamond drills, set 4 ft. 5 in. apart on the carriage side, which carry solid bits of 1 13-16 in. diameter and with positive screw feed. In cutting a channel alternate holes are first drilled by setting the machine on the appropriate notches in the special notched rail of the aforesaid movable track, used for that purpose. Then, the remaining

mond method is free from this waste, it thus has an advantage in channeling the more valuable marble.

The gadder used is a Sullivan, of the usual type. It drills horizontal holes 10 in. apart and 3 ft. deep, with centers only 1½ in. above the floor at the foot of the stone blocks. There is only one bit used; this is of 1⅛-in. octagon steel, 3 ft. 6 in. long, with a chisel point 1⅜ in. wide. As soon as the line of gad holes is completed, two half-round feathers, 1¼ in. diameter and 12 in. long, are inserted in each hole, and the block is split off by driving home, between the feathers, ¾ by 1-in. steel wedges, 12 in. long. After pushing the back

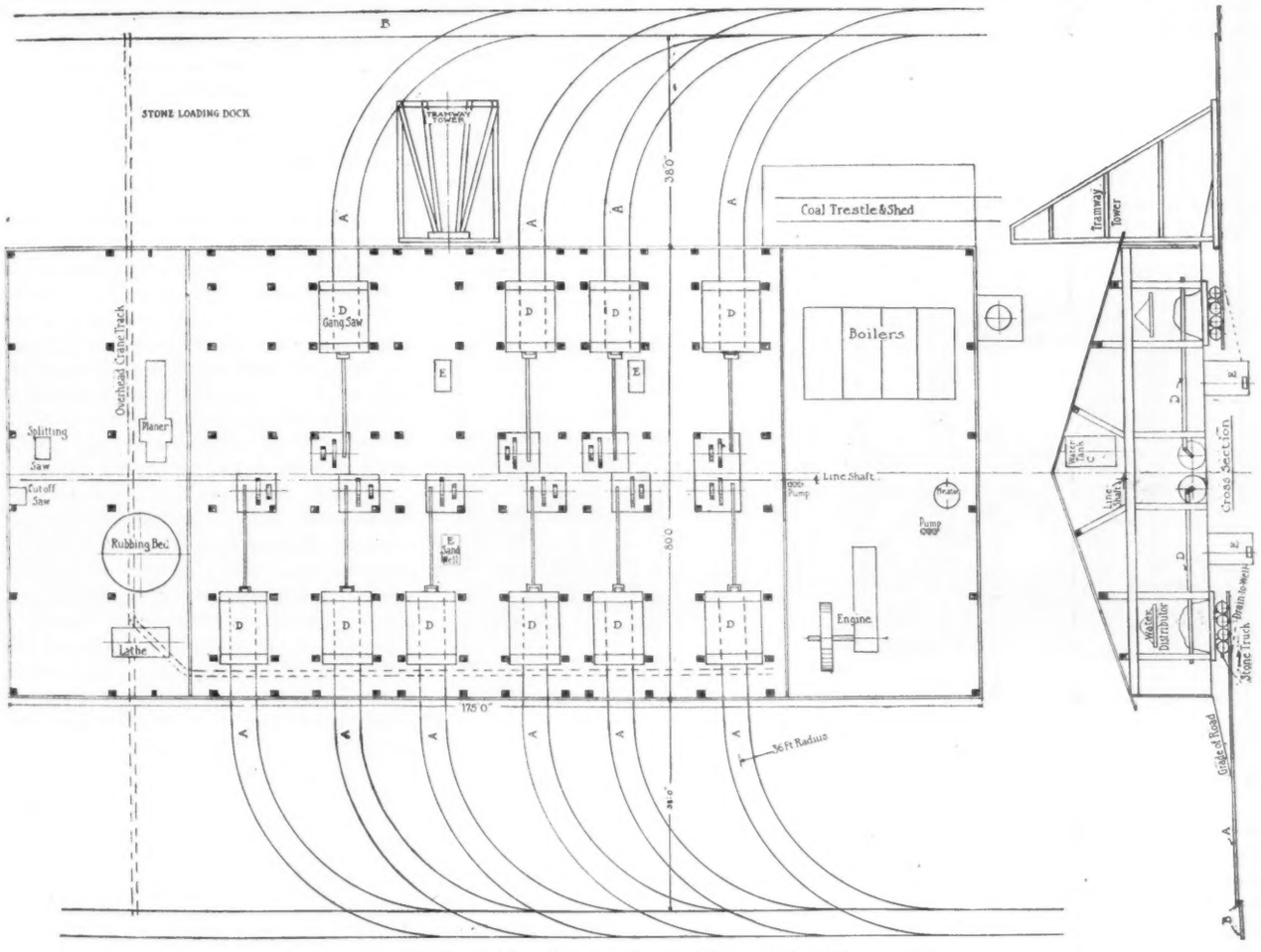


FIG. 2. PLAN AND ELEVATION OF RYLSTONE MILL.

when detached by the gadder they will contain 112 cu. ft. and weigh a ton. The channeler cutting-chisel is made up of five bits, of which the end and the central bits have their cutting edges at right angles to the channel and the second and fourth bits have chisel edges set at 30° to the channel. The chisels are in sets of four lengths (2 ft. 6 in., 4 ft. 6 in., 6 ft. 6 in. and 8 ft. 6 in.), with a cutting width of 1¼ in. in the shortest and 1 1-16 in. in the longest. The steel used for the perpendicularly set bits is ⅞x1⅝ in., and for the diagonally set, ⅞x1 in. The channelers cut from 30 to 60 sq. ft. per 10-hour shift.

holes, to obtain a continuous channel, are drilled by inserting rods in the holes previously drilled, each side of the moving bit. The cuttings are washed off through the channels to the water sump, and the stone is laid out so as to obtain blocks 4 ft. 4 in. by 4 ft. 4 in. by 6 ft., as previously described. A bit can drill a 6-ft. hole in 10 minutes, and 75 sq. ft. is the usual record for 10 hours. The bits are adjusted to gauge every few weeks, and with care in selecting the diamonds give very little trouble. The percussion bit, when run at any efficient speed, will crush and strain the stone blocks for several inches away from the channel, and as the dia-

of the block away from the channel, and prying up its lower outer edge with a 600-lb. crowbar, high enough to insert some 6-in. round cast-iron balls as support, the crane's chain can be dropped back of the block and pulled around it by a long hook inserted from the front. Nothing now remains but to hoist the block to the surface and set it on the truck running to the mill. The rough surface left on the marble floor by the gad holes, after the removal of the block, must now be chiseled or blasted smooth enough for the channeler floor for the next cut.

As the best example of a Gouverneur marble mill, I will describe the new one

of the Rylstone company, pictured in Fig. 1 and diagramed in Fig. 2. It is a 12-gang installation, though as yet only nine have been put in. The stone is brought from the quarry on the hill above by an overhead wire cableway, 250 ft. long, with a carrier rope of 2½ in. and a traction rope of ¾ in. diameter. The cableway crab will pull a freshly detached block from the quarry and transport it directly to the stone truck at the mill. This stone truck can then be pulled by a team of horses over the mill-track system (4 ft. 8½ in. gauge), and by the proper switch *A* (Fig. 2) can be conducted under any gang saw and sawn while still on the truck. After the blocks are sawn they can be shoved on the same trucks to the railroad cars on the tracks *B*, that connect with the main line of the R. W. & O. railroad, about one mile distant.

The Extra Dark company's mill, instead of switches, uses a transfer car for its stone truck. The truck rests on rails on the top of this car, which are at right angles to the track on which the transfer car runs. From the transfer car (when set opposite the desired gang) the stone truck can be run directly under the saws. The old system that is still used in the other Gouverneur mills was to have no rails inside the building; but to remove the stones from the truck, draw them on rollers by horses over the mill floor and finally deposit them on a wooden pedestal under the selected saw.

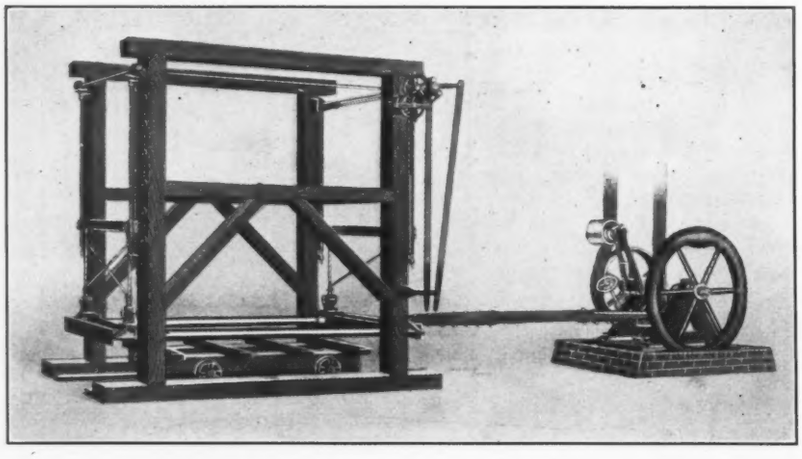


FIG. 3. SINGLE PITMAN GANG-SAW.

The Rylstone mill's power plant consists of a simple non-condensing Fishkill-Corliss engine of 150 h.p., supplied by two 100-h.p. return-tubular boilers. The exhaust traverses a Smith-Vaile vertical feed-water heater, the feed water being fed by a 4 by 4-in. Rumsey triplex power pump, drawing water from the three storage tanks *C* (Fig. 2). Another Rumsey pump of the same size supplies these tanks from an adjoining pond.

Fig. 3 is a cut of the single-screw pitman gang-saw, made by the Lincoln Iron Works, of Rutland, Vt. This admits a stone 10 ft. by 6 ft. by 6 ft., and is arranged at spaces *D* (Fig. 2). The regulator shown governs the speed by which the saws are fed down to their work. The saw blades are ⅛ by 3-in. soft steel, about 12 ft. long, and wear from 6 to 10 days before having to be consigned to the scrap heap. Sand and water is fed upon each blade from a trough distributor set overhead. The sand and water run down from under the gangs, through cemented sluiceways to sand wells *E* (Fig. 2). Thence they are lifted back to the distributors by a vertical belt-driven centrifugal pump, set at each well bottom. The gang-saws make 80 to 120 double strokes a minute, and saw about 1½ in. per hour (counting stops). In the Extra Dark mill it has been found that as high as 3 in. per hour can be averaged by the addition of a liberal proportion of crushed steel, of buckshot size, to the cutting sand. This innovation, however, is as yet in its experimental stage in Gouverneur.

The rubbing bed *F* (Fig. 2) is used to square up sawn blocks to exact dimensions. It is a cast-iron table of 12 ft. diameter, turning 30 r. p. m. about a vertical shaft. The marble blocks are laid stationary upon it and the revolving bed grinds them with sand and water.

At the Rylstone quarry no polishing is done; the blocks after sawing are finished to the required dimensions with stone cutters' tools, to be later supplemented by the planer, splitting and cut-off saws and lathe, not yet installed. In the other mills the marble, after finishing with the rubbing bed, planer or lathe, is rubbed by hand-stones with water and sand of graded fineness, to be finally polished with a revolving brush burnisher.

The considerable quantity of marble extracted, that is unfit for sawing, was formerly thrown on waste heaps or down abandoned quarries. Three years ago the Northern New York Company installed a modern dry crushing plant to utilize this waste. The marble enters the crushing mill from the waste heaps in a wooden skip, automatically being dumped over a No. 5 Gates breaker. Thence it is raised, about 40 ft., to the head of a trommel by a 20-in., six-ply, rubber-belt elevator, with continuous sheet steel buckets, which runs 165 ft. per minute. The trommel is 3 ft. 6 in. diameter, with a total length of 16 ft. Beginning at the head, the first 8 ft. has ½-in. holes, the second 4 ft. has ¾-in. holes, and the last 4 ft. has 2-in. round holes. Around the first 8 ft. of the trommel is fastened an outer circular screen of 4 ft. diameter, whose upper half has 3-32-in. and the lower half ⅜-in. holes. This trommel, turning at 30 r. p. m., separates the crushed material into five sizes, viz.: 3-32, ⅜, ½, ¾ and 2 in. The oversize, from the trommel, falls through a Blake jaw crusher back into the boot of the 20-in. bucket elevator.

This plant is built as a tower, with the trommel at the top and a stone bin (with separate compartments for the various sizes) at the bottom, the bins spouting into railroad cars. The bucket elevator rises from beneath the breaker, placed on a platform alongside the tower. In this way the only machine requiring constant attention, the Gates breaker, is outdoors, to minimize the danger to health of the dust.

The power installation is located in an adjoining shed, and comprises a 13 by 16-in. Brownell high-speed engine, supplied with steam from a 100-h.p. return tubular boiler. When running to the full capacity of 250 tons of crushed stone per shift, the force required comprises one engineer, three breaker men, one car loader, and one machinist-foreman. The coarser sizes of stone are shipped for road metal and concrete, the finer (from the 3-32 and ⅛ in. screens) are in demand for the top dressing of pavements and for artificial stone.

As in other branches of the mineral industry, machinery for doing the rough work of quarrying and dressing has superseded hand labor in the Gouverneur marble deposits. This fact, coupled with the large and readily accessible beds of raw material, renders the future outlook encouraging.

Werner v. Bolton, in *Zeit. f. Elektrochem,* 1905, XI, pp. 503-504, gives details of tests upon the hardness of tantalum in the purest form that has yet been obtained. The results obtained show that tantalum, containing only very small amounts of oxide as impurity, after hammering into sheets at a red heat, is equal in hardness to the best and most carefully finished steel. Tantalum, however, greatly exceeds this hard steel in toughness, for, while these hard tool steels are brittle, tantalum can be rolled into sheets without injury. The new metal in its purest state, combines the hardness of the best steel with a greater toughness and ductility than is known to be possessed by any other metal.

Steel, with ¼% C, 1% W, 2-5% Mn and ¼% V, broke at 112,540 lb. per sq. inch.

Accidents in the Anthracite Mines.

In his annual report for 1904 on the anthracite coal mines of Pennsylvania, James E. Roderick, chief of the Department of Mines, makes some comment on accidents, which deserve attention. His remarks are given below, nearly in full:

Accidents in and about the anthracite mines occur with alarming frequency. This is especially true of the accidents that result from falls of coal, slate and roof, and from mine cars. Many lives, also, are lost in the shafts by reason of deranged machinery or through the carelessness of the engineers. Two very serious accidents of this kind occurred during the year; one at the Auchincloss shaft of the Delaware, Lackawanna & Western Railroad Company, by which 10 lives were lost, and the other at the Baltimore shaft of the Dorrance colliery of the Lehigh Valley Coal Company, by which four lives were lost. In each case the engineer lost control of his engine.

More accidents resulted from falls of coal, roof and slate than from any other cause. At least one-half of these accidents could have been avoided if the victims themselves, their co-employees and the men directly in charge of the mines had been more careful. On an average, six lives are lost by falls to one by explosion of gas. While the law demands that, as the men advance in their workings, the persons in charge shall see that all dangerous parts are taken down, this is only partly done, and we cannot hope to reduce the number of accidents until both parties—employer and employee—perform their duties with greater fidelity. The employee should use his best judgment, especially when sounding doubtful parts of the coal, sides or roof, and should make an effort to take down, or to make secure by timber or otherwise, all such parts. The employer, on his part, should see that the foreman has a sufficient number of assistants to cover every working place in the mine at least once a day. He should see that the people who are actually engaged in the mining of coal are enabled to do so under the safest conditions possible. The foreman's assistants for this work could be designated timber bosses, and their special duty would be to examine the safety of the roof and sides of every working place, and to see that sufficient timber is furnished the miners, and that the miners put up the timber when needed. The timber boss should also make a note of the condition of each place as to its safety and as to the ventilation, and his observations should be recorded in a book to be kept in the mine office for the inspection of the foreman, the superintendent and the miners, and especially for the inspector while on his tour of duty. Books for this purpose could be furnished by the Department of Mines. A penalty should be attached for any violation of the law on the part of the superintendent, foreman, timber boss or miners. We shall never have the pleasure of recording a reduction in the number of accidents from falls until there is a more systematic effort made by both employer and employee to keep the working places in a safer condition.

Of the 496 lives lost inside the mines during the year 1904, 75 were lost in 23 accidents. The loss of life was as follows: By falls, 10; explosions of gas, 12; explosions of powder and dynamite, 18; cars, 4; falling down shafts, 9; fumes from mine fire, 5; fumes from locomotive in a tunnel, 10. The causes of these fatalities can be classified as follows: Negligence of victims, 14; negligence of others, 33; unavoidable, 28. It is a regretable state ment to make that of the 75 persons killed, 33, or 44%, lost their lives by the carelessness of other people. There ought to be a law by which such carelessness would be made punishable by a heavy fine and imprisonment.

Of the 496 persons killed inside the mines, 3 were foremen, 1 fire-boss, 233 miners, 145 miners' laborers, 31 drivers and runners, 20 door-boys and helpers, and 63 other employees. On the surface there were 99 fatal accidents, including 1 foreman, 5 blacksmiths and carpenters, 3 engineers and firemen, 11 slate pickers (men and boys), and 79 other employees. Of the fatalities, 83.4% occurred inside the mines, and 16.6% outside. Of the 161,330 employees, 68.4% were employed inside, and 31.6% outside. Of the 496 fatal accidents inside the mines, about 75% occurred among the miners and miners' laborers. These two classes are the heaviest sufferers in the way of fatalities.

Every year when the accidents that occur in and about the coal mines are analyzed, it is found that the responsibility rests to a great extent with the victims themselves. Of the 595 lives lost during the past year in and about the anthracite mines, 282, or 47.4%, were lost through the negligence of other victims, 56, or 9.4%, through the negligence of other persons. In the case of 53, or 8.9% of the accidents, the responsibility cannot be determined, and the remaining 204, or 34.3%, are classed as unavoidable. These figures are truly a sad commentary on the supervision and carefulness of the persons most interested—the operators, superintendents, foremen and miners.

The blast-furnace is not suitable for the reduction of titaniferous iron ore. But in the electric furnace it is possible to obtain a finai product containing a large or small percentage of titanium as desired. The advantage of the treatment of titaniferous iron ore, vast quantities of which exist in the United States, lies in the value of the by-products, particularly the ferro-titanium and titanium carbide.

Transportation in China.

In U. S. Consular report, No. 2378, Oct. 5, 1905, Consul Anderson reports on transportation conditions in China, describes and emphasizes the value of the Empire's waterways, and shows what is possible and probable in railroad building.

The practical deadlock in the construction of railways in China, which has existed for the past year or so, is just as marked as ever. As a matter of fact the war had very little to do with the general railroad movement in the Empire. The continued delay is due to the Chinese rather than extraneous reasons, and probably represents an economic movement which is of the utmost importance to American business. The Chinese people have no appreciation of the development of a country by railroads, although the need of some railroads in China is appreciated by them. They seem to feel that in many ways and in most places there is no need of any change. For heavy freights in some parts of the Empire this is really the case.

The amount of goods transported in China by coolies, and in the northern portion of the Empire by carts, is beyond the belief of those who have not had occasion to investigate the subject. In the interior of the greater portion of the country coolies and canals carry all freights, and what this means can be understood to a fair degree perhaps when it is realized that there is practically no railroad service at all in the more populous and richest portions of an Empire containing 400,000,000 of people or more. In most of the Empire there are no roads worthy of the name. In the northern provinces the traffic in carts of a rough sort dominates the entire movement of goods, in the districts concerned, to the seaboard. Where waterways are frozen a great portion of the year this is of necessity the case.

It is in that portion of the Empire where waterways are frozen much of the year that the first hold of the railroads has come. The greater portion of the Empire is served by waterways where it is served at all. Along the Chinese coast there is a series of navigable rivers coming down from the interior, a series which has few equals, all things considered, in all the world. From the Yalu and Pei-Ho, at the north to West river, passing through Canton, in the south, these rivers seem to be formed to reach inland from the coast, connecting not only the coast cities with the interior cities, but the interior cities with each other by way of the coast as well. About midway between the north and south, the great Yangtze reaches far into the interior, navigable almost to the western border of the Empire, and by its tributaries offering still further connection with interior points. The rapids of the Yangtze have been and still are a drawback to the development of the upper portion of the Yangtze valley. But

these rapids probably can be subdued at an expenditure ridiculously small, compared with the enormous benefits to follow. That this will be done in the near future, and that steam navigation, regular and safe, with Chunking and the upper river will be established and maintained, is beyond question.

The most interesting, and in some respects the most important feature of the waterway system in China, however, is the canal system. Running more or less parallel to the seacoast from Hangchow to Peking, through a very rich portion of the Empire, certainly the most important portion, commercially, to the United States at the present time, is the Grand or Imperial Canal region. Connecting with this, at either hand, are smaller canals. These, in turn, connect with still smaller waterways, and still farther are smaller streams, until the whole Yangtze and Yellow river plains are a vast network of waterways, designed originally for irrigation very largely, but used at the present time both for irrigation and transportation. To become conversant with Chinese commercial conditions, one must thoroughly understand this system of streams and canals. It is a characteristic part of the life of the Chinese people. There will be no system of railroads to supplant it in its close relation to life here, and any commercial system or theory which disregards it will fall short of success. The rivers and waterways of the Empire will be the basis for heavy transportation and traffic for years to come, and the railroad system (for which there is hope) will not supplant but merely supplement them.

What an adequate railroad system would do for China cannot accurately be measured, so great are the possibilities. But there is not the bright prospect in railroad affairs in China that there ought to be, and the indications are that there will be even worse conditions in the near future than those now obtaining. There are in operation about 2,200 miles of railroads in China; there are in the course of construction possibly 1,500 miles more. Concessions for railroads have been granted all over the Empire. It may be said that every railroad China needs has been planned twice over, and concessions for many of them are already granted. But this does not mean that the lines are being constructed, or that they will be constructed. The moment that any serious work on a railroad is commenced, under a concession held by foreigners, there is opposition, delay and finally nothing accomplished.

The general prospect for any change in the general transportation facilities of the Empire in the near future is not very encouraging. It hinges on political and social changes which will not come very soon.

Determination of Silver in Blister Copper.

BY CLARENCE C. SAMPLE.

Mr. E. C. Bierce first suggested to me the possibilities of utilizing the solubility of copper oxide in a hot 10% solution of sulphuric acid, to remove the copper before determining the silver and gold by fire assay; the more valuable metals being insoluble in acid of that strength, are left in the residue. Frequent checks by other "combination methods" have led me to employ this method on several occasions when quick results were required, and the results have always been satisfactory.

A small sample, preferably not exceeding 5 grams in finest filings, is weighed out into a 20-gram crucible or 2½-in. scorifier, and set in the front part of the muffle. The door should be left open to allow a free entrance of air. The copper soon blackens from oxidation and should be stirred with a wire nail, to expose fresh surfaces. Avoid a temperature sufficient to fuse the particles together. The crucible or scorifier is removed, allowed to cool, and the contents dumped into a beaker; crucible and beaker are marked so that the fusion may be conducted in the same vessel in which the roasting was done.

Hot, not boiling, 10% solution of sulphuric acid is poured into the beakers; stirring or heating aids solution, but the acid must not be allowed to concentrate by evaporation. The copper oxide is rapidly dissolved, leaving a residue of unoxidized copper, silver, gold and other insoluble matter, which is filtered through a gum paper and washed with hot water. The paper is dried, returned to the crucible or scorifier from whence it came, and incinerated at a low temperature.

Should the amount of copper that escaped solution be large, repeated roastings will be necessary for its further elimination. The final residue may contain some copper without materially affecting the results of the assay. The residue, after burning off the filter paper, is, if a crucible has been used, charged with a flux containing an excess of litharge, with sufficient reducing agent to give a 20-gram button. A suitable flux would be: litharge 2 A. T., soda 1 A. T., borax glass 10 grams, sufficient reducer to give the button, and a cover of borax glass. If a scorifier has been used, add 70 grams of test lead and 3 grams of borax glass. Either assay from this point on is conducted as usual. The slags and cupels are re-run when a correction assay is desired. The buttons from the cupels may be parted and gold determined, or the gold may be run separately.

It is essential that the filings or cuts from a saw be very fine; coarse borings oxidize only on the surface, having an inner core untouched, requiring repeated roastings before the copper may be removed, in which case the method is slow, tedious and inferior. For a like reason a small sample is preferable.

With fine filings, the method is rapid and manipulation easy. Results have been obtained within five hours, at the most.

Amending the Pennsylvania Mine Laws.

In the annual report of the Department of Mines of Pennsylvania, which has just appeared, James E. Roderick, chief of the Department, makes the following suggestions:

In last year's report attention was called to the necessity of amending the mine laws of Pennsylvania, and the opinion was expressed that one law, modeled after the English law, would meet all the needs of this State. The law is enacted to safeguard the health and life of the employees and to preserve the property of the operators. Whatever tends to protect the life and preserve the health of the anthracite miner would fulfil the same purpose with the bituminous miner. It is not the duty of the Department of Mines to draw up a new code of mine laws, unless instructed to do so by the Governor, but we assume it to be our duty to call attention to this important matter.

The legislature should pass a resolution authorizing the Governor to appoint a commission, whose duty it should be to draft a mine law to meet, as far as possible, the present conditions of the mining industry. Or, two commissions might be appointed, one to revise the anthracite law, and one to revise the bituminous law. Both the operators and the mine workers are fully aware of the need that exists for such revision, but they are deterred from making an effort toward this end, as each party fears that the other might gain some advantage in the revision. The present mine law, it is well known, is merely a compromise, with a nullifying proviso attached to almost every clause of importance.

In the composition of the last commission to amend the mine laws, the miners had a majority. To give a majority either to the miners or the operators is unfair, and can hardly be expected to produce satisfactory results. There is no valid reason why a commission should not be created to draft a law that would be fair and just alike to the employer and the employee. Any law emanating from a commission of operators, engineers and miners must necessarily be more or less of a compromise. A commission of men expert in mining matters, who have no financial interest in mining, should be named and given the power to look into the needs of the mining interests of the State. They should have the power to compel the attendance at their meetings of operators, engineers, superintendents, foremen, miners, mine inspectors, and any other persons who they think could enlighten them on the subject.

After getting sufficient data they should call into consultation a constitutional

lawyer of high repute, to make the final draft. The representative persons who had given information to the commission should be called together again and the proposed act submitted to them. Any objections, corrections or amendments by any of the interested parties should be submitted to the lawyer, to be clothed in proper legal language. When this is done, a meeting should be called of the representatives of the different interests, including two operators, two mining engineers and four miners from the anthracite region, and the same number from the bituminous region, together with four mine inspectors, two from the anthracite region and two from the bituminous region. This should be the final hearing, after which a draft of the proposed law or laws should be completed and presented by the commission to the next Assembly.

The commission should be provided with ample means to pay witnesses. It should meet at intervals in Pittsburg and in Wilkes-Barre.

A law should also be enacted to cover metalliferous mining operations and quarries in the State. In the clay mines especially, there is great suffering from lack of ventilation, and from the reports received at the Department the death rate among the employees is proportionately as high as among the coal miners. The clay mines might be looked after by the bituminous inspectors, but in order to give proper attention to the other mines and quarries more inspectors would be needed.

Concrete-Block Prize Awards.

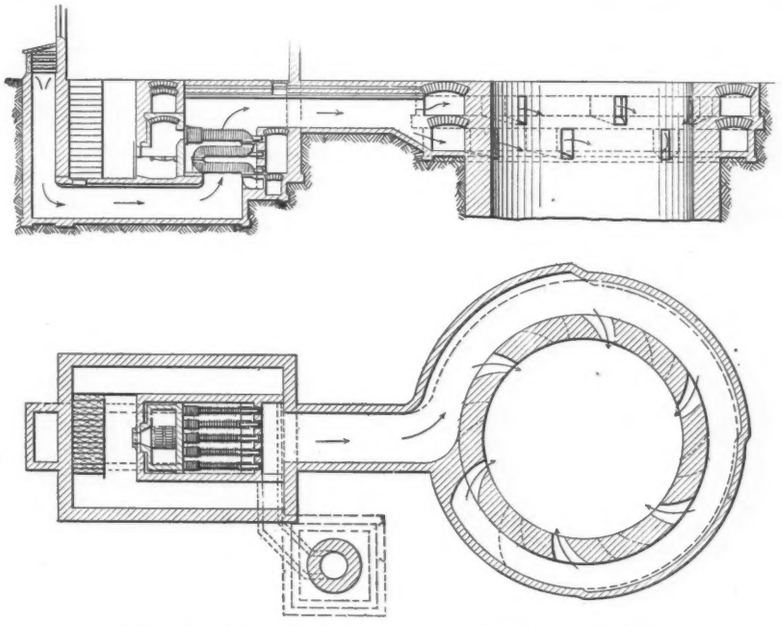
The prizes offered by *Engineering News* and *Cement Age*, of New York, for the best papers on "The Manufacture of Concrete Blocks and Their Use in Building Construction" have just been awarded by the jury, which was composed of Messrs. Robert W. Lesley, past-president of the American Cement Manufacturers' Association; Richard L. Humphrey, president of the Cement Users' Association; and Prof. Edgar Marburg, secretary of the American Society of Testing Materials.

The first prize of $250 was won by a paper by H. H. Rice, of Denver, Colo., secretary of the American Hydraulic Stone Company. The second prize of $100 is given to a paper by Wm. M. Torrance, of New York city, assistant engineer in charge of concrete-steel design for the Hudson Tunnel Companies.

H. D. McCaskey, of the Mining Bureau, Philippine Islands, states that in Bulacan, in the mountains east of the towns of San Miguel de Mayumo and Angat, important deposits of rich hematite and magnetite have been known and worked by natives in a small way for over a century. Some of them are fully up to bessemer grade. Correspondence is now in progress with iron works in Japan looking to the profitable shipment of these ores.

Prevention of Ice in Downcast Shafts.*

The formation of ice in downcast shafts greatly hinders regular working, in proportion to the volume of air needed in the mine. Up to the present time two principal methods have been tried for stopping such formation of ice; by suspending a bucket of burning coke at the mouth of the shaft, or by mounting steam-heated radiators in the shaft a few yards above the part most likely to freeze. The first of these methods has the disadvantage of being dangerous, being likely to cause an outbreak of fire, and has the defect of introducing noxious fumes into the workings. The second method is also unsatisfactory, even when arrangements are made for draining off the water of condensation in the radiators, the efficiency of the apparatus being very low in comparison with the cost. In other cases attempts have been made to get rid of the ice by jets of steam in the shaft, but the effect was merely local.



DEVICE FOR THE PREVENTION OF ICE IN DOWNCAST SHAFTS.

A method of dealing with the problem is to be found in the device, illustrated herewith, brought out by Herr Tomson, of the Dahlbusch colliery, in association with Messrs. Goehmann & Einhorn. It has been employed in the shafts of this colliery for some time. The intake air enters through a flue some little distance from the shaft, into which it flows through a number of openings. The air is warmed by contact with a set of pipes, which serve as flues to a furnace burning waste coke or coal dross. When the first of these appliances was erected, the ice already formed in the shaft melted within 24 hours. On days when the surface temperature was 9° F., the temperature in the mine, 326 yd. below the surface, was 37½° F. (this with air suply of 212,000 cu. ft. per min.). The cost of attendance is practically nothing, and the whole initial outlay, including brickwork was only £160.

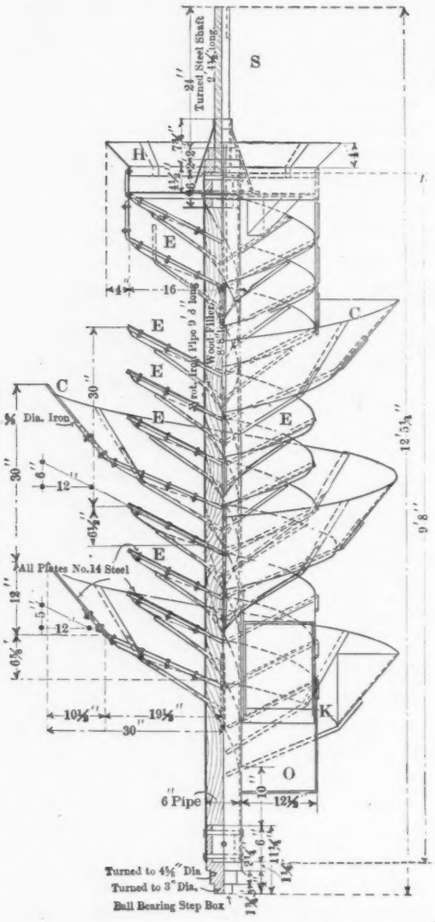
*From "Glückauf."

Origin of South African Diamonds.

An interesting paper on "The Diamond Pipes and Fissures of South Africa" was recently read before the British Association by H. S. Harger. The author considers that the age of the Orange River Colony and Cape Colony pipes is Triassic (late) or Jurassic, and that the Pretoria pipes are contemporaneous. "They are," he said, "the latest eruptives of South Africa." The origin of the blue ground in the pipes he considers due to the shattering of the ultra basic rocks, such as eclogite, pyroxenite and lherzolite, all of which are commonly met with and are made up of the minerals which form the bulk of the blue ground. In these rocks garnet occurs plentifully, and also olivine and pyroxene. The diamond has frequently been found crystallized in garnet, and more rarely in olivine; hence the gem must have had its genesis in the ultra-basic zone in which those minerals originated. The experiments of Crookes and Moissan suggest that the presence of iron was necessary for the formation of the diamond; but to this, Mr. Harger objected, owing to the fact that the necessary iron does not exist in the diamond mines, and also because Dr. Friedlander's experiments proved that diamonds can be formed in olivine without the enormous pressure and heat aimed at by other experimentalists. In conclusion, the author expresses the opinion that a deep-seated ultra-basic zone, in which garnet and ferromagnesian silicates predominate, was the medium in which the crystallization of the diamond occurred.

Deadening of Vibrations.

La Nature of August 5 states that Prache has, after a long study of vibrations and earth tremors, of noises and shocks, classified them into groups in accordance with the method in which they are propagated. He has also devised a system of preparing insulated foundations. He experimented with a great variety of substances, and found that india rubber was the only one which possessed in a high degree the three necessary qualities of homogeneity, durability, and elasticity.



HALF SECTION. HALF ELEVATION.

FIG. 1. NICHTER SPIRAL.

He was able to formulate the speed with which vibrations are transmitted through rubber, which may, by having recourse to suitable precautions, become as low as a few meters per second. Instances are given of numerous cases in which, by the use of foundations of this type, machinery which had before caused considerable annoyance has been completely silenced. In one case, the sound of a hammer used for beating leather, and striking 150 blows per min. on an anvil 4.72 in. in diameter, could no longer be heard through the party wall which separated the workshop from an adjoining dwelling. It is pointed out that there are a multiplicity of uses for this invention, especially in connection with electric power stations.

The Nichter Spiral Slate-Picker.

The mechanical cleaning of coal is constantly receiving more attention. If possible, hand-picking is to be practically eliminated. After being sized in the screens, the coal will be picked and repicked on several series of mechanical slate pickers; all "bony" goes to the washery. The accompanying illustrations show a mechanical spiral for cleaning coal, which is to be used in the Truesdale breaker and washery of the Lackawanna Company. This device is essentially the old Pardee spiral with certain important modifications, for adaptation to the varying character of coal coming from the mines. The improvements are the invention of Frank Nichter (chief mechanical engineer of the Delaware, Lackawanna & Western Coal-Department). The spiral is operated by revolving it about its vertical shaft; the speed of revolution is varied to suit the particular coal being cleaned. At most collieries a number of seams are mined at the same time, and the nature of coal may be very different in each, requiring special treatment.

In the Nichter spiral slate-picker, the material to be cleaned enters the machine at the top and travels down several small spiral chutes by gravity. During the travel of the material down these chutes, the heavy slate tends to keep near the shaft in the center, while the lighter coal tends to work to the outer edge, finally dropping over into another and larger chute or apron. At the bottom of the machine, the separation of the coal and the slate should be complete.

A perspective view of the Nichter machine is given in Fig. 3, which shows the spiral in course of erection, and before the chutes (leading to the top and from the bottom) were placed in position. Details are given in Fig. 1 and 2.

The detailed course of the material is as follows: Entering hopper *H*, the coal starts down the spiral by chutes *E* (which pitch downward and toward the center shaft *S*). As noted, the coal tends to work outward from chutes *E*, and into chutes *C*, while the slate continues in chutes *E* to the bottom of the spiral. The slate is collected into one chute at the bottom, and goes to the slate pocket; the coal leaves the spiral by another chute. On account of the revolution of the machine, a special arrangement of chutes is provided to handle the separated coal and slate as they leave the machine.

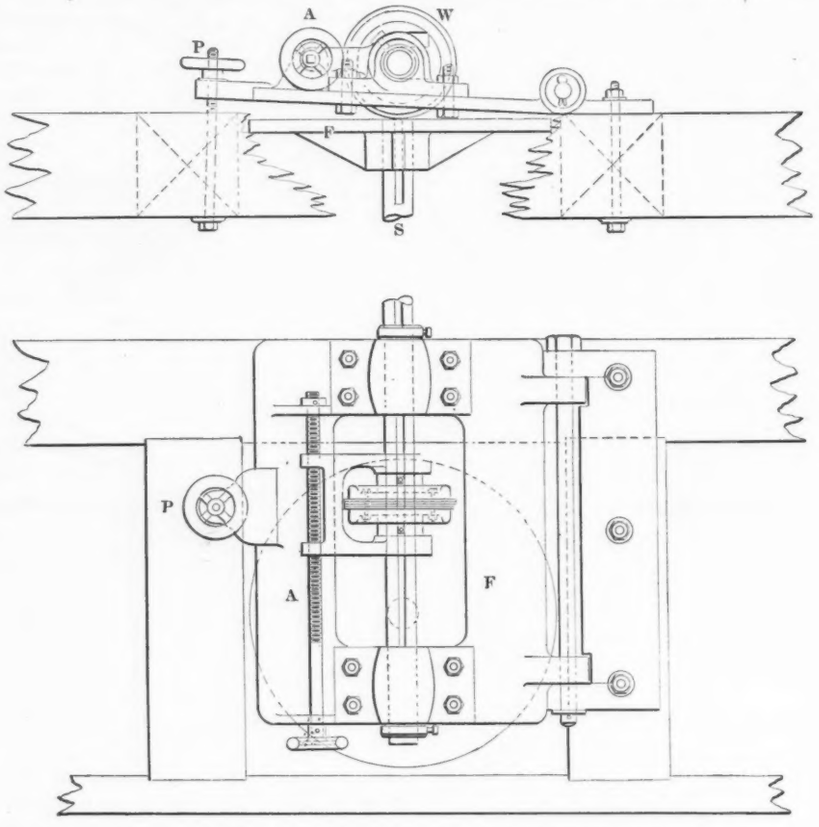


FIG. 2. SPEED-REGULATING MECHANISM FOR NICHTER SPIRAL.

Some adjustment is necessary to adapt the machine to the quality and condition of the material treated. The revolving of the spiral and the regulating of its speed are illustrated in Fig. 2. Shaft *S* revolves the spiral; at the upper end is a disk-wheel *F*. Power is transmitted to wheel *F* by means of a leather-wheel *W*, whose distance from shaft *S* may be changed at will, by turning the small wheel *A*. To run the spiral faster, *W* is moved nearer the shaft *S;* but away from

it, if slower speed is desired. This operation is, in all its essentials, the same as the well known variable friction-feed, as used in saw-mill practice. The friction is regulated by the turning the hand-wheel *P*.

The speed at which the machine is run is an important factor in its successful operation. The spiral revolves in the direction opposite to that in which the coal travels around the central shaft. When the coal does not run down the chutes fast enough its motion is assisted by giving the spiral a few revolutions more per minute. When the coal goes too fast, the

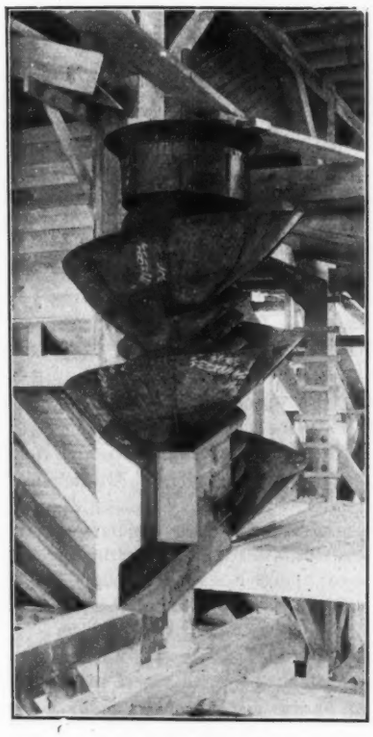


FIG. 3. NICHTER SPIRAL.

turning speed is decreased. Ordinarily the spiral is run about 10 to 12 r. p. m.

Some coal may be dirtier than others, or more wet, and will not travel as fast on chutes as cleaner and drier coal. Thus, when the spiral is first used, or when it is rusty after standing idle for a time, the steel chutes will not work the same as when polished by the coal and slate. On the whole, the old spiral slate-picker has been made more efficient by the Nichter adjusting device.

H. D. McCaskey, Chief of the Mining Bureau, Philippine Islands, reports that the old Spanish workings show large bodies of high-grade copper ore in Lepanto, in the district of Mancayan. About 40 claims have been located by Americans, who plan systematic exploration work. In the province of Batangas work has been done in the Loboo mountains on a group of claims containing copper carbonate ores with a trace of gold.

The Surzycki Steel Process *

BY S. SURZYCKI.†

This process is based on that of Talbot, with the essential difference that it can be carried out in any fixed furnace of not less than 25 tons. This practice is mainly based on the arrangement of two or more tap-holes placed one above the other, but out of the vertical, the holes leading to a double launder by which the whole or a part of the contents of the furnace may be easily emptied at any time. The tap-holes are arranged in a cast-iron plate, lined with magnesite bricks and stamped dolomite; they give no trouble, since they can neither slip, sink, nor corrode. When the molten bath has sunk to a level with the bottom of the tap-hole, it is agitated by a rabble, freeing the bottom from metal. Immediately some shovelfuls of dry burnt dolomite are thrown against the tap-hole from the charging side, and the last drainings of metal are removed from the hole from the tapping side, and it is made fast on that side.

The hearth of the furnace stands perfectly, and remains sound for months. As a rule, only the slag line and (to a less extent) the blocks require repair. At the Czenstochowa works there is a 25-ton furnace measuring between blocks 26 ft. 3 in.; width, 8 ft. 7 in.; and depth of hearth from 1 ft. 8 in to 2 ft. During its first campaign it made 574 charges by the continuous process, and was stopped only for local reasons. After repairing the ports and roof, and repacking the chambers, the furnace was again started, and has made over 690 charges, and it is hoped will work up to 1,000.

The chief material is, of course, molten pig iron. The conditions for working have not been specially favorable. The pig iron, taken from a 70-ton mixer, into which it is run from a single blast-furnace, could be improved, both as to homogeneity and quality. The variations in the chemical composition of the pig iron are shown in order, as follows: Carbon, up to 3%; graphite, up to 3.7%; silicon, 0.8 to 1.9%; manganese, 0.6 to 1.5%; phosphorus, 0.5 to 0.8%; sulphur, 0.02 to 0.10 per cent.

These variations have a great influence on the production of the furnace, and in order to lessen them the hotter and more graphitic pig iron is treated with iron ore (Krivoi-Rog ore containing about 63% of iron). This consists simply in throwing the fine previously heated and dried ore into the stream as it runs into the movable ladle. There is produced a more or less intense reaction, according to the temperature and the composition of the pig iron which promotes the conversion of graphite into combined carbon, and the oxidation of the silicon and manganese.

*Abstract of a paper read at the annual meeting of the Iron and Steel Institute in London, May, 1905.

†Manager of the steel works of La Société D'Hantke, Czenstochowa, Poland.

The pig iron, somewhat refined by this treatment with ore, when brought into the furnace requires less ore there, and works down more quickly. The production of the furnace is closely dependent on the quality of the molten pig iron. The graphitic pig iron, rich in silicon, will take much longer to work down than iron without graphite and with a less percentage of silicon. The influence of large variations in the chemical composition of the pig iron is of especial importance, as the ore and lime additions have to be measured by the eye.

This composition plays a rôle in this process only in reference to the graphite and sulphur. Pig iron rich in graphite being difficult to treat in the open hearth furnaces, the percentage of manganese is not essential, and is only of importance in that a higher percentage of manganese retards the refining process. The percentage of phosphorus can go very high; with more than 1% the slag must be drawn off as quickly as possible after the refining period, since the reduction of the phosphorus from the slag must be avoided. A rich phosphoric slag that can be sold for agricultural purposes, can be obtained.

The furnace makes usually three 25-ton charges in 24 hours. When the blast-furnace is working well, and a pig iron with low silicon and manganese is obtainable, four charges can be made. The following is a record of the work of the furnace for a recent month:

	Tons.	Kg. per 1 Ton of Good Ingots.
Cold pig iron	140.80	70.3
Molten pig iron	1,809.50	903.1
Ferro manganese	20.9	10.4
Scrap	19.8	9.9
Iron ore (Krivoi-Rog).	458.1	288.6
Lime	144.3	72.0
Alumina	0.08	....
Burnt dolomite	107.7	53.8
Chrome ore	2.0	1.0

Good ingots	2003.7 tons.
Scrap	41.8 "
Working days	26
Production per day	77.07 tons
Yield	102.72 %

While the yield is given as 102.7%, the daily reports are made up with a certain amount of circumspection, and it may be taken that the average yield is not less than 103½ to 105%. From this one could easily reckon the reduction of the iron from the ore. In the Krivoi-Rog ore there is an average of 63% of iron; that is to say, in the whole amount of ore introduced there are 288.6 tons of iron. Since in the pig iron added there is 5% of foreign bodies, and for the other metals added 5% of loss can be taken, there has been, if we take the average yield of 104%, 180 tons of iron, or 62.3% reduced. This reduction of iron from the ore in an essentially oxidizing apparatus, such as the open-hearth furnace, must be looked upon as a great advantage, and it is scarcely possible in any other refining operation, even in the Talbot furnace, to obtain a greater reduction.

The coal consumption is considerably less than with the ordinary process, as the

furnace, when continuously worked, stores up an immense amount of heat. The coal consumption for the whole steel plant (which consists of five furnaces, four of which are ordinarily in operation), since the introduction of the continuous process has fallen about 9 or 10% (reckoned on the production of good ingots).

The making ready of the charge according to the method described, and also according to the Talbot process in tipping furnaces, takes place partly in the steel ladle. I say "partly," as actually the charge must be finished sufficiently in the furnace itself. The test taken from the furnace before tapping, and before the addition of ferro-manganese, must be capable of being hammered out without any fault, must possess the wished-for hardness, must be perfectly dephosphorized, must show a perfectly sound fracture, and must remain quiet in the small test ingot mold. This being so, the charge can then be tapped, and at the same moment a regulated amount of finely ground ferro-manganese is thrown against the stream of steel as it falls into the ladle. A fairly active reaction is produced, which, after one to one and a half minutes, quiets down completely, and when the metal has stood for a short time teeming can be commenced. It appears incomprehensible why just as good a quality of steel should not be obtained by this method as by any other. In the first place, the quality of the final product is dependent on the quality of the pig iron employed. It is clear that from a pig iron high in sulphur or copper it is more difficult to produce a good quality than from a first-class pig iron. One can always help matters by the addition of spiegel, or in other ways even more easily in the continuous process, as the impurities in the pig iron are taken out more easily and with less trouble by admixing it with the soft, pure bath of metal remaining in the furnace than in the ordinary process, where one would have to treat the poor pig iron alone. It must be observed that in the 25-ton furnace, with the deeper hearth, 25 tons as a rule are tapped, and the same quantity of molten pig iron poured in, 15 tons of pure soft metal being left behind. Thus the capacity of the furnace by this process is increased to 40 or 45 tons, although it was constructed as a 25-ton furnace only. In the second place the dephosphorization, by means of the slag, goes on quicker in the continuous process, since the pig iron, while being poured into the furnace, is already partially dephosphorized during the reaction. The charge must be carefully worked down before tapping and before adding ferro-manganese in the ladle, since the influence of the calculated amount of ferro-manganese is only to bring about the deoxidation of the metal and the introduction of the necessary amount of manganese in the steel.

An imperfect admixture and an imperfect influence of the ferro-manganese is, as a rule, impossible, as the lively reaction proves.

It is obvious that special quality steel is more easily made ready in the furnace itself than in the ladle.

I append a series of analyses and mechanical tests from a large number of charges which were made by the continuous process:

No.	Cu.	Mn.	P.	S.	*R.*	*i.*
1	0.08	0.60	0.05	0.01	39.93	30.0
2	0.08	0.55	0.06	0.02	38.20	28.0
3	0.09	0.57	0.03	0.04	37.12	30.5
4	0.09	0.55	0.03	0.02	37.50	30.5
5	0.09	0.50	0.03	0.03	38.71	33.0
6	0.09	0.62	0.05	0.04	38.91	30.0
7	0.08	0.57	0.05	0.06	37.89	28.0
8	0.09	0.59	0.04	0.03	37.69	28.5
9	0.09	0.56	0.01	0.02	37.98	29.0
10	0.075	0.41	0.02	0.06	34.21	30.0
11	0.09	0.60	0.04	0.05	37.45	28.0
12	0.09	0.60	0.02	0.02	36.84	29.2
13	0.08	0.52	0.03	0.05	34.71	30.0
14	0.08	0.46	0.03	0.05	33.66	35.0
15	0.07	0.47	0.05	0.03	34.15	33.2
16	0.08	0.56	0.03	0.03	38.71	31.5
17	0.08	0.59	0.06	0.04	36.55	30.0
18	0.07	0.42	0.05	0.02	36.67	33.5
19	0.09	0.60	0.06	0.05	41.86	30.0
20	0.075	0.54	0.07	0.03	40.74	31.0

R = tenacity in kilograms per square millimeter; *i* = extension, per cent.

As may be seen from the above, the ingot iron produced by the continuous process leaves nothing to be desired. Open-hearth ingot iron is never absolutely homogeneous, but the metal made ready in the ladle itself is quite as homogeneous as that made by the ordinary process with the additions added in the furnace. The above analytical data and mechanical tests show also that this is so, since the two are in accordance with each other, although the tests for the chemical determinations and those for the mechanical tests were taken at different times and in different places during the pouring of the charge.

In order to be in a position to decide finally as to the homogeneity of the product, a parallel series of carefully conducted analytical experiments was carried out on ingots made by the continuous and by the ordinary processes. On the same day two charges were taken, one from furnace No. 3, which was made ready in the furnace itself in the ordinary way, and the second from the continuous furnace, No. 5, which was deoxidized in the ladle by the addition of ferro-manganese. These showed that in both cases the differences in the composition were very nearly the same; in the continuous process the differences as regards the carbon and manganese were rather less, and as regards the phosphorus rather greater. In both cases the metal was very hot, and thus the variations in the composition were not inconsiderable. These experiments have a great importance, as they demonstrate that metals made by the ordinary process and by the continuous process are similar to each other, and make it clear that the former fears as to the metal deoxidized in the ladle being less homogeneous than that produced by the ordinary process were perfectly groundless.

The continuous process can be still further developed, but in any case it has shown, during the last two years of practical work, its capabilities and advantages. These advantages do not consist solely in the continuity of the process itself, but in the longer life of the furnace, the higher production and yield, the lessened fuel consumption, and in the simplicity of the whole plant and practice. There may be here and there some imperfections, as is the case with everything new, but these in time will be mostly overcome.

Fire Tests of Window Glass.

Windows and skylights of this material were recently tested at the plant of the British Fire-Prevention Committee. In the window test five squares of wire glass, 2 ft. 3 in. by 4 ft. 6 in., were set in a brick wall, one in a brick frame, two in steel frames, and three in brick reveals. The glass was ¼ in. thick. The following details are from *Engineering News*, Oct. 5, 1905: The fire lasted for 45 min., with temperatures ranging from 650° F. to 1,540° F.; immediately on lighting the gas the glass in all the openings cracked, particularly around the edges, but beyond the cracks increasing no particular change occured during the firing. The fire did not pass through the glass. On application of water through a ¾-in. nozzle under 45 lb. per sq. in. pressure an irregular patch of small holes was made in the upper portion of the center window, which was also bulged inward; otherwise the glass in all the windows remained in position.

In the skylight tests four squares of glass, about 2 by 2 ft., were placed in the roof of the test house so as to set horizontally. The fire lasted 45 min. and reached a temperature of 1,650° F. Immediately on lighting the gas the glass in all four squares cracked in various directions; beyond this no perceptible change occurred during the fire test. Water was applied to the underside of the glass through hose and also poured on the tops of the glass; its effect was to develop hair cracks all over the glass, but no water passed through.

F. E. Elmore, of London, in Eng. Pat., No. 13,578, of June 15, 1904, describes a process of ore concentration, in which the ore is pulped with a liquid, and the pulp is electrolyzed by being fed into a vat between pairs of converging electrodes, of which a number of pairs are arranged in series vertically, there being devices for deflecting the rising particles from the descending pulp. The liquid if non-conducting may be rendered conducting by addition of sulphuric acid. The bubbles of gas given off during the electrolysis attach themselves to certain particles of the ore, which float and become separable.

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THE ACTIVITY of the iron trade in Great Britain is shown by the pig-iron production, which usually keeps very close to demand in that country. The total for the first half of 1905 is reported by the British Iron Trade Association at 4,621,600 tons; an increase of 572,635 tons, or 12.4%, over the first half of 1904. The general range of prices is high also, though the squeeze in warrants of two months ago has entirely passed.

THE CANALS AT the Sault Ste. Marie, in the five and a half months from the opening of navigation to the end of September this year, passed 15,844 vessels, carrying the enormous quantity of 31,947,743 tons of freight. This is an average of 94 vessels per day; and the average cargo for all boats, large and small, was 2,016 tons. The importance of the canals to the mining industry is shown by the fact that over 90% of the freight was iron ore, coal and other minerals; 74.5% being iron ore.

Lake Superior Iron-Ore Shipments.

The total movement of iron ore from the Lake Superior region by water this year, up to Oct. 1 was 25,473,606 tons, an increase of 87% over last season. With two months of navigation left, this points to a total approximating 35,000,000 tons for the season; an increase of 75% over last year's movement. The great tonnage this year is largely due to increased consumption; but in part also, it results from the reversal of the policy of the Steel Corporation, which is accumulating large stocks in its furnace yards, while last year the shipments were limited to the needs of the furnaces.

Pennsylvania Mining Law.

On another page we give some suggestions as to the revision of the Pennsylvania mining law, made by Mr. Roderick, chief of the Department of Mines of that State. The plan suggested is exceedingly conservative, but would, at any rate, serve to co-ordinate the various provisions which have been added to the law from time to time, often hastily, not always wisely. Like much of our legislation, the Pennsylvania law is the result of gradual growth, of compromises, and of the influence which special interests have brought to bear on the legislature. Its revision and the formulation of a consistent code is desirable, and we hope it may be undertaken soon.

Car Shortage.

Car shortage and delays in transportation, on account of insufficient motive power, are just now important factors in the coal and iron trades. There are always complaints at this season, when the movement of grain and other freights is heavy; but this year the matter is more serious, and many roads are badly congested. The matter, moreover, is one that cannot be quickly remedied. Orders for new equipment were not generally placed in the last half of 1904 and the first part of the present year, when few railroad managers seem to have expected a period of such active traffic as the present. Now, the manufacturers are overwhelmed with orders, and can promise delivery of cars and locomotives only after long delays. Meantime the trades suffer.

Zinc Ore in Mexico.

A good deal of zinc ore is now being obtained from the vicinity of Monterey, Mexico, the shipments amounting to several thousand tons per month. This ore is being exported partially to Europe, partially to the United States. It is chiefly a zinc carbonate, assaying 37 to 43 per cent zinc. Blende is also being produced, and it is expected that the output of that class of ore will increase. The deposits of both blende and calamine in that vicinity are thought to be large, and they may prove a valuable new source of zinc.

Several concerns have established ore-buying agencies at Monterey. The freight rate from that point to Europe is so low that the resources of the district are immediately available. Mexico has other large resources of zinc ore, and promises to become a considerable factor in the supply of that raw material.

Broken Hill.

A very remarkable report is that which was attached to the semi-annual statement of the Broken Hill Proprietary Company for the six months ending May 31, 1905. At that time the company completed 20 years of productiveness. The ore deposit at Broken Hill was discovered in September, 1883, by Charles Rasp, a sheep herder. Prospecting was immediately begun, but it was not until toward the end of 1884 that the rich surface ores were uncovered. The Broken Hill Proprietary Company (itself the successor of the Broken Hill Mining Company) was organized August

12, 1885. Its career has been an uninterrupted record of success.

During the 20 years of its existence it has produced 7,747,306 tons of ore, yielding 733,025 tons of refined lead, 7,201 tons of antimonial lead, 4,576 tons of copper, 129,740,728 ounces of fine silver and 82,933 ounces of fine gold.

Its receipts have been £26,808,743 from the sale of products, and £576,000 from the sale of land. Its working expenses have been £17,123,774; depreciation, £938,999; dividends, £8,576,000; reserve and insurance funds, £165,500; leaving a balance of £580,470 to profit and loss account. The dividends paid out of profits amounted to £7,984,000, which is nearly 30% of the receipts from the products of the mine, an excellent showing.

The Broken Hill lode was one of the greatest silver-lead deposits of the world. Time will show if it be not the greatest of any discovered up to the present time. There are few districts which have made a larger output of lead. The Cœur d'Alene, which began to be productive only a year later than Broken Hill, is credited with a total of 850,000 tons to the end of 1904, but that output has been derived from several lodes. The production of Leadville has probably been about 800,000 tons. These figures are only a little in excess of the output of the chief producer at Broken Hill, where there are several other important mining enterprises.

Broken Hill is still far from decadence. It has already developed a large production of zinc ore, and it promises to become a powerful factor in the world's supply of spelter, its zinc resources being enormous. It has been the scene of great experiments in mining and metallurgy, which have resulted in some extraordinary improvements in practice. It is not merely the increase in metal production that the world owes to Broken Hill; its contributions to technical knowledge, which have been capable of application elsewhere, have been not the least of its benefits.

The Cobalt District.

The Cobalt district in Ontario is a remarkable region in itself, and its discovery has caused more excitement in Canada than any mining event in recent years. Interest in the development of the field is maintained by continual reports of new finds, or rich shipments. The influx of prospectors, speculators and others into the Cobalt mining district shows no falling off. At the Bureau of Mines in Toronto there is a continual stream of enquirers in search of information as to how to secure claims, and the Provincial government is beset with deputations of mining men regarding the numerous questions that have arisen in connection with mining rights.

The latest phase of the excitement is the dealing in shares in Cobalt mining companies, some of which are placed on the market at low figures to tempt the small investor. Judging from the number of companies incorporated, or seeking incorporation, there is likely to be a repetition of the gold-mining excitement of some years ago, in which many people foolishly invested in companies of a speculative character started on insufficient capital, which was largely absorbed in promotion expenses and lavish advertising. "Cobalt" has become a word to conjure with, and in a mining boom there are always some over-sanguine or unscrupulous people to take advantage of such a situation.

Dr. Barlow, of the Dominion Geological Survey, recently secured during a visit to Cobalt a lump of mineral weighing 285 pounds, the estimated value of which is about $1,000. It was found by one of the workmen on the La Rose mine, when engaged in stripping, and is declared by Dr. Barlow to be the richest specimen he has yet seen. Director Gibson, of the Provincial Bureau of Mines, says, in reference to a statement by Dr. Barlow that the Lake Temagami region is of the same nature as the Cobalt mineral district, that he considers this opinion correct to the extent that the slate conglomerates of the Lower Huronian series characterize both districts, as well as much surrounding territory. It is possible, however, that there may be some difference in composition or texture, and that the Cobalt rocks are somewhat less tough and hard, and so more amenable to the fracturing process by which the fissures were formed in which the valuable ores were deposited. Mr. Gibson further states that while cobalt-nickel ore had been found near Lake Temagami, it was in trifling quantities as compared with the finds of the Cobalt region and unaccompanied by silver. Possibly the Cobalt district may be found to have its counterparts in other portions of the territory, but so far no duplicate has been discovered.

Anthracite Consolidation.

The sale of the stock of Coxe Brothers & Company to the Lehigh Valley Company, particulars of which are given elsewhere, removes from the field the most important of the individual operators, and is one step further toward the absolute unification of the anthracite trade. The transaction is a parallel one to the absorption of the Pennsylvania Coal Company by the Erie several years ago, and was completed by the same banking firm in New York. The only one of the large independent companies left is the Lehigh Coal & Navigation Company, and the stock of that corporation was syndicated some months ago, and is now believed to be held by representatives of the large companies, who secured it to prevent its sale to the New York, New Haven & Hartford Company. Moreover, the transportation and handling of the Lehigh Coal & Navigation Company's coal is so covered by long contracts, that it cannot be counted in any sense as an independent factor in the market.

The late Eckley B. Coxe—in his time an important figure in the anthracite trade—consolidated and developed the group of collieries about Drifton, built a short railroad to connect them, and secured recognition as one of the anthracite concerns to which an allotment was made under the old agreements; and this was continued under the tacit understanding which was established when agreements went out of fashion. By his persistence and independence he secured also a contract under which his firm—and the corporation which succeeded it—has run its trains through over the Lehigh Valley tracks to tidewater, and has sold its coal independently. To some extent it has been a troublesome factor, though its managers have, as a rule, acquiesced in the tacit understanding, to which reference is made above. All possibility of misunderstanding is now removed.

The Lehigh Valley Company, it must be said, pays a heavy price for its new purchase. The consideration is said to be $20,000,000, though the details of the payment have not been made public. An estimate made some time ago put the unmined anthracite in the Drifton properties at 70,000,000 tons. On this basis the price paid is equivalent to nearly 30 cents per ton of coal in the ground, making no allowance for waste in mining and preparing, or other losses. The shipments of

Coxe Brothers & Company for the first nine months of the present year were 1,196,079 tons; for the year they will be approximately 1,500,000 tons. As with all the anthracite companies, shipments are seldom up to the full capacity of the collieries, and 2,000,000 tons yearly could be reached without increasing the present plant. Taking the larger figure, the purchase is therefore made on the basis of $10 capital per ton of yearly product. As the Lehigh Valley Company is to issue 4% bonds to finance the transaction, the yearly interest charge will be equivalent to 40 cents on every ton that can be mined. This cannot be considered a light burden, though the price is not much higher than the Erie paid for the Pennsylvania Coal Company's property.

There still remain in the anthracite country some so-called independent operators, such as G. B. Markle & Company and Pardee & Company. They are not independent, however, in the same sense as the Coxe Company was, since their coal all goes to market over the lines of some one of the large carrying companies, and they have no power to disturb prices or understandings. Two or three new companies have lately been organized to open collieries in the Wyoming Valley, but they will be under the same conditions.

The time when conflicting interests and competition among the companies marked the anthracite trade, ended practically nearly ten years ago, when the Reading passed under the control of J. P. Morgan & Company, and allied interests became prominent in the management of other companies. The present sale marks the final passing of the independent operator as a factor to be considered.

The Supply of Zinc Ore.

The average price of ordinary spelter at New York during the ten years ending with 1900 was 4.365 cents per pound, the maximum and minimum for the period having been 5.75 and 3.52 cents respectively. The maximum was attained in 1899, the year inaugurating the extraordinary industrial activity which has continued (with only slight set-backs) to the present time; the minimum was in 1894, the year following the silver panic, when all branches of business crumbled into the slough of despond. A comparison between these figures and those of the first half of the present decade indicates clearly a radical change in the position of this metal.

In 1901, the average price was 4.07 cents per pound; in 1902 it was 4.84 cents; in 1903 it was 5.40 cents; in 1904 it was 5.10 cents; in 1905, according to present indications it will be upward of 5.75 cents. Such a continued high range of prices is evidently due to a fundamental condition. Examination of the statistics of ore and metal production indicates what that condition is. While the consumption of spelter has been increasing materially, there has been substantially no increase in the production of ore in the Joplin district, which up to five years ago was practically the sole source of Western spelter, although the price bid and paid for ore has risen to figures undreamed of previously to 1899. The increased demand for raw material has been filled entirely by Colorado, and other Western States.

Up to the present time, the production of zinc ore in the States and Territories west of the Rocky Mountains has been no more than enough to keep pace with the increased demand for spelter. Just now, there is even a shortage in that character of ore. This is, however, simply a temporary condition, inasmuch as the resources of the mixed zinc and lead ores of the far West are so great, that it is only a question of time before they can be produced in very large quantities. The production is, in fact, chiefly dependent upon the provision of the proper milling facilities. No permanent shortage in the supply of zinc is to be anticipated.

It is well known that the tendency of lead and copper veins is to change into zinc ore with depth, as Professor Shaler remarked in his recent paper on the exhaustion of metal supplies. For this reason, he did not foresee the same shortage in the supply of zinc, that he anticipated with respect to iron, copper, lead and certain other metals. Though we did not agree with the general conclusion of Professor Shaler's paper, we do certainly agree with him as to the probability of an abundant supply of zinc ore. An excellent indication of the profuseness with which zinc exists in the Rocky Mountains is to be found in the experience of the silver-lead smelters, who seek to avoid zinc as far as possible, penalizing it heavily in their smelting charges. Nevertheless, the average slag produced by the Western silver-lead smelters contains approximately 6 per cent zinc oxide, or about 5 per cent metallic zinc. The total quantity of ore smelted by the works in Colorado, Utah and Montana is approximately 2,000,000 tons per annum, which would make in round numbers 1,800,000 tons of slag. Assuming that slag to average 5 per cent zinc, there is the equivalent of 90,000 tons of zinc per annum (approximately half of our present spelter production) being thrown away by the silver-lead smelters; a further large quantity is similarly wasted in copper matte smelting. We do not mean to imply that this zinc could be recovered, or rather that it would under any circumstances be economical to recover it. We mention the fact merely as an indication of the widespread occurrence of zinc ore and its great abundance in the States and Territories west of the Rocky Mountains.

Zinc mining in that portion of the country has already become a very profitable industry, and bids fair to increase both in importance and in profit. The advantage of the ores of the Rocky Mountains is their high grade as raised from the mine. Whereas in the Joplin district an ore containing only 4 per cent of zinc and 0.5 per cent of lead is mined and milled, it being necessary to work 20 to 25 tons of crude ore in order to obtain one ton of the concentrate suitable for smelting, in Colorado, Utah, New Mexico and elsewhere there are numerous large mines which yield ore assaying 15 to 40 per cent. of zinc and 5 to 10 per cent of lead, besides some gold and silver content. The cost of mining and milling is somewhat higher, because of the higher rates for labor and material, but it is not so much higher as to offset the advantage of the higher grade of the crude ore. Thus while mining and milling can be done in Missouri for $1.10 per ton of crude ore, the cost at Leadville is $2.50 to $3 per ton, but when the cost of production is based on the marketable ore it shows in favor of Colorado and similar localities, because fewer tons of the crude ore are required to make a ton of the concentrate.

The Joplin ore is, however, far superior in quality to the majority of what can be produced in the far West, and so long as it can be produced at the present rate, it will be the dominating factor in the market. The increased price of spelter during the last five years has been chiefly due to increased cost of production, particularly to increased cost of ore in the Joplin district.

Metallics.

Zinc unites with mercury in a series of white brittle amalgams, which become pasty when the mercury is in excess.

The first steam engine was brought to this country in 1753, and was used for unwatering a mine shaft in the State of New Jersey.

For some excavations the dipper dredge is preferred, because it leaves a surface that is comparatively smooth and free from lumps and ridges.

Concrete floors are not suitable for use about electrolytic or lixiviating plants because acid solutions attack and gradually disintegrate the cement. However, the action can be largely prevented by asphalt coatings.

Sand-piles, when used in places where the ordinary soil has insufficient bearing value for foundations, give a compacting effect, that, in many cases, has permitted the erection of structures that would not otherwise have been practicable.

The air-lift pump is an effective means of handling acid solutions. It can be made in such small sizes that it has been used for such detail work as raising the circulating electrolyte in copper refinery work; it can also be used for large installations.

A recent analysis of lead from the St. Joseph Lead Co. (produced from the galena ore of southeastern Missouri) showed the following composition: 99.9163% Pb; 0.064% Cu; 0.016% Ni and Co; 0.001% Fe; 0.0013% Sb; 0.0008% As; and 0.00007% Ag.

The Bethlehem Steel Co. uses fluid compression in casting large ingots. After pouring, the molten metal is subjected to pressure, and this is continued through the process of cooling; the resulting material is comparatively free from blow holes and other imperfections.

Zinc and tin combine in all proportions, forming alloys which are always white, harder than tin and softer than zinc. On cooling, the tin tends to concentrate in the bottoms, so their composition is not always uniform. These alloys are used to a slight extent in castings for ornamental purposes.

Telephones used in places where the vibration is excessive often give poor results. This is due to some little extent to the packing of the granular carbon in the transmitter, which prevents the free movement requisite for the varying resistance upon which the transmitter depends for its action.

Grouting in different localities has decidedly different characteristics. In New York city, the mixture is rich in cement, while the same term, in other places, is used for very lean and for medium mixtures. Sometimes it is a mixture of cement and water only, sometimes with the addition of sand.

Manilla rope does not show, from the outside, the actual amount of wear that really may be present. In ropes of this character the principal effect of use is shown in the grinding up of the fibers comprising the core, wearing it into short pieces, or even into powder. This is especially noticeable with ropes that pass over sheaves or pulleys of small diameter.

The ordinary pile driver cannot be very much improved in the matter of capacity. It is true that steam drivers have been, and are being, successfully used; but the shorter period taken in driving does not materially affect the total capacity of a crew. The main cause of the limited output in driving piles is the length of time necessary to adjust the pile and the machine, to the position required; this is irrespective of the type of driver used, and the rapidity of action of the latter has so slight an effect upon the total time spent that the increase in the number of piles driven per day is very small.

Buckled plates are sometimes used for floors that have to support very heavy loads. If used with the buckle suspended, they will develop much more strength than if used in the usual arched form. This is due to the fact that any deformation of the arch tends to extend itself, forming flat places; these fail more readily (being subject to compression) than would be the case were the buckle suspended. The latter form is subject to tension, and so allows the use of higher "permissible strains," and no deformation affects the character of the strains until the plate reaches the point of failure.

An alloy of two parts of aluminum and one part of zinc is equal to good cast iron in strength, and superior to it in elastic limit. Its color is white. It takes a fine, smooth finish and does not readily oxidize. It melts at a dull red heat, or slightly below, and is very fluid, running freely to the extremities of the mold and filling perfectly small or thin parts; in that respect it is said to be superior to brass, but it is brittle, and hence unsuited to pieces which require the toughness possessed by brass. The tensile strength of the alloy was found to be approximately 22,000 lb. per sq. in., and its specific gravity 3.3.

The use of the economizer in steam-power practice is of benefit, primarily, to the boilers. It relieves them of the temperature changes due to the introduction of cold water (if feed-water heaters are not used), but is itself most effective when fed with warm water. Many engineers use economizers made with fittings of standard weight, and then go to useless expense in providing extra heavy pipe fittings and pipe. When the feed pump is working under ordinary conditions the economizer and the pipe line are subjected to a pressure that is, except for the frictional loss in the piping and economizer, precisely the same; the two should, therefore, be proportioned for the same strains.

In plumbing deep mine shafts, the iron wires, by which the weights are suspended, will sometimes throw the survey off. This is caused, sometimes by magnetic attraction from bodies in the mine itself; sometimes by neighboring electric currents, due to the close proximity of transmission lines or power houses; and sometimes even by actual charges on the wires themselves, either static or dynamic. The latter form gives rise to the "Ampére effect" and tends to force the wires apart, or attract them to each other, as the case may be. In very deep shafts it may even be due to the force of gravity alone, the depth in this case being sufficient to cause an appreciable warping of the plane in which the wires hang.

Spelter is now produced in Europe in small quantities by smelting in an electric furnace, under the patent of C. G. P. de Laval, in which the laboratory of the furnace is heated by an arc between electrodes which pass into it. No details as to the thermal efficiency of this furnace and the various technical results have yet been published, but spelter from it is regularly on the market, brand "G. D. L.," and is guaranteed not to contain more than 0.1% of impurities. Analyses show only 0.03 to 0.06% lead, 0.01% iron, and no arsenic or cadmium. These show it to compare very favorably with the brand "Extra pur A" of the Société de la Vieille Montagne and with the various brands of American high-grade spelter. At present the "G. D. L." spelter is sold at a slight discount from the other high-grade spelters, although it is well within the requirements for that class of metal.

In the quick analysis of smelter work, in cases when a precipitation, a filtration and a titration are concerned (especially when the titration is directed toward the filtrate), it is often convenient to precipitate first and then perform part of the titration in the presence of the alien precipitate, reserving the remaining titration to the critical end-point till after filtration. This is illustrated in the KCN determination of copper, in the presence of the omnipresent iron. Here the solution is "copper-blue" from the ammonia added to throw down the iron. The advantage of performing part of the titration before filtering off the iron is, that in this way, most of the copper is decolorized from the very teeth of the gelatinous ferric hydrate, which would otherwise retain a not inconsiderable part of the copper if it were filtered at once. In this case just enough color can be left before filtration to insure that the chemist has not passed the end-point. This principle is capable of a wide application and without wasting extra time; indeed, it is a time saver.

Colliery Notes.

In the retail markets in Philadelphia, a ton of coal is 2,240 lb.; in New York, 2,000 lb.; and some suburbs only 1,900 pounds.

The car-dumpers at the Hoboken (N. J.) docks of the Lackawanna railroad are two in number, each handling a car in three minutes' time. This gives an hourly capacity of 1,000 tons each.

In mines ventilated by natural means, the variations of the conditions causing movement of the air are attended by corresponding variations in velocity and, consequently, in the quantity and purity of the supply. Measurements are of little use in cases of this kind, unless taken at frequent intervals, and the results averaged.

In some mining districts the prevailing "miner's phthisis" gives rise to a race of flat-chested, pot-bellied individuals whose lungs are not "mates." This is generally understood to be a result of the rigidity of the chest wall, which makes the breathing almost entirely abdominal. One lung is affected to a greater extent than the other in most cases.

The exhaust steam in shafts where steam pumps are used may be utilized to some extent to increase the draft. This is done by turning it into a ventilating pipe connected with the branches into the levels. The condensing action creates a partial vacuum which serves to draw the air from the open end of the individual branches, somewhat in the manner of an injector.

There is a saying among the miners in some districts to the effect that the air from compressed-air mains or exhausting from pneumatic machinery is injurious. This probably arises from the use of inferior oils for lubrication; they will sometimes give off carbon monoxide or dioxide in quantities sufficient to render the air "bad." The unnatural reduction of the temperature of the air when taken into the lungs also induces inflammation.

Some conveyors run "bow-legged;" that is, the weight of the coal or other material carried in the conveyor is so disposed that the wheels upon which the weight bears wear unevenly; also the shaft will sometimes bend, or the chain will twist, and any one of the three is liable to cause this result; which can be best described as a tendency for the wheels to take such a position that the flanges of opposite wheels are inclined toward each other at the top, somewhat like the inclined lines of the letter A.

The work in the caissons used for deep foundations is somewhat commensurate with the miner's work in "hot" mines. The caisson work represents the extreme condition; the mine work is like to it in proportion as the air becomes heated by the compressed air or steam exhaust, or vitiated and "heavy." In mine work, high pressure is absent, and this renders the workman less liable to disease; the work, however, is almost equally arduous and the men consequently rapidly become exhausted and cannot work as long shifts as in cooler mines.

In the cement district of Northampton county, Pennsylvania, large numbers of fence posts are made of slate. The slate deposits are used in cement-making and the posts are made by using slabs about 1 in. thick by 10 in. wide; these are from 8 to 10 ft. long, and have holes cut through them for the fence rails, the same as in the familiar wooden post. One trouble with this form is the fact that the entire fence is apt to lean far to one side or the other, due to the narrow edge presented. The posts are permanent, however, and do not need to be replaced on account of decay.

The overlapping pivoted bucket conveyor as used for coal handling in power-plant work has seen the development of several ingenious devices. Most of these are made necessary by the influence that the overlapping edge has upon the revolution of the individual bucket. One manufacturer has gone to considerable trouble to develop a scheme that would permit the bucket to revolve through a complete circle; another takes equal pains in providing means to keep the buckets from turning through more than 180°. Some of these devices work largely by gravity, while others are positive in their action.

One of the characteristic features of lignite is the large percentage of moisture that it contains; and some geologists have proposed to use this fact as a basis of separation between it and low-grade bituminous coal. A moisture content of 10% has been proposed as the basis of separation between bituminous coal and lignite. This is not, however, a safe basis for a scientific division into these two great classes of coal, for the reason that many of the well-recognized bituminous coals of the Mississippi valley contain a greater amount of moisture than 10%, and it would be manifestly incorrect to class them as lignite, or even lignite coal.

There is a new coal-handling plant in the New York district that presents some unusual features. The hoisting tower is so high that the operator could not see the clam-shell bucket distinctly if he were located at the usual part of the tower, and his machinery and his own lookout are therefore placed near the level of the ground in order to afford him a near view. Under this arrangement, he cannot see the bucket when it reaches the extreme height of its travel, nor can he see it unload. This condition has resulted in the development of automatic machinery which relieves him of all responsibility after the bucket is filled and the hoisting started. The raising, traversing, dumping and return motions are all effected by automatic machinery. The capacity has not yet been recorded, as the plant has not been operated for any lengthy period.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Gold Mining in South America.

Sir—Mr. Curle's article in this JOURNAL (Sept. 30, 1905, p. 577) omits, from the "economic factors," something that is an important drawback to the prosecution of work at numerous localities in South America; I refer to the bad climate. This unfortunate feature has been recognized by every engineer who has worked in the tropics or in sub-tropical countries, and at elevations but little above sea level. This has been recognized by insurance companies and by certain English and American companies who have sent out two men for each of the more responsible positions on the local staff. These two men alternately spend one-half their time in the low land attending to business and the other half in the higher country driving malaria from their systems.

The malarial areas are generally found near the rivers, particularly the larger ones forming the arteries of transportation of the country. But there is little malaria on the hills, and almost none in the mountains.

If a man is permanently located at a fair elevation and away from the swamps, fevers seldom trouble him; but when his business calls him to travel over the country, he is sure to come down with the fever. As nearly all the South American countries lack modern transportation (of which Mr. Curle writes), the traveler must stop in many unhealthy places, he must put up with poor sleeping places and with poorer food, with bad drinking water and with an abundance of germ-carrying insects.

If located in the low countries, the miner will be more sure of his fever than he will be of his salary.

Of the various quartz mines that I have visited in South America, not half a dozen have been in unhealthful climates, and of such as were badly located all could have had their dwellings conveniently placed above the danger line. The quartz miner will not be troubled by sickness as much as the gravel miner.

The gravels of a number of the tropical rivers have been worked for years, and many of them are still being profitably washed; but it is in the working of these rivers on their banks and bars that the white men have sickened and died, or left the country.

Several of the rivers have sand and gravel of an ideal character for dredging. On these rivers, the matter of transportation will be of less moment than that of

keeping the staff in working order. These rivers are attractive, and it will not be long before foreign capital will begin to be interested, as has been the case in the more healthy country to the south.

Whether it is possible to live in malarial districts and avoid the fever entirely, the writer is unable to say, but it is certain that much of it is due to pure carelessness.

Those who are intending to operate dredges or to work placers by other means, in or near the tropics, should bear in mind the climate; they must prepare for it, and guard against its evil effects if they do not wish to be disappointed in South American mining ventures.

F. F. SHARPLESS.

Westbury Station, N. Y., Oct. 3, 1905.

Lump-Sum vs. Pound-Price Contracts for Steelwork.

Sir—The editorial, in your issue of Sept. 30, on the subject of different forms of contracts for steelwork, brings to mind an instance that happened in my own experience, in an engineering office where I happened to be employed. The office was that of one of the kind of contractors you evidently have reference to, and the instance I cite will serve to show the lengths to which some firms will go in the endeavor to obtain a profit to which they are not entitled.

The firm had in the draughting room at the same time two contracts very similar in character, the one let to them for a lump-sum, and the other being carried on a pound-price basis. For the first, the regular standard sizes were used for all details; the column sections, the sizes of beams and the section of the bracing being specified by the architect in each case. There were no roof trusses, the roof beams being supported on the upper columns in each case. For the pound-price contract, the seat angles on the columns were made of 6 by 6 by ¾ in. stock, and the beam connections of the same. This size weighs more than twice as much as the 6 by 4 by ⅜ in. stock used to do the same work for the lump-sum contract. The stiffeners, instead of 3 by 3 by 5-16 in. angles (as on the lump-sum contract), were made of 5 by 3 by ½ in. angles, which, also, weigh twice as much as the standard size. The only reason that ¾-in. stiffeners were not used instead of ½-in. was the difficulty that riveting would entail. Even the tie-plates on the columns, instead of being made 9 by 5-16 in. were made 9 by ¾ in., and the same policy was carried out in all the details. The actual difference in the amount of costs I am unable to give; it must, however, have been at least 40%, for the supporting members were themselves very light.

The engineer who has not experienced anything of this kind is apt to think that "extra material doesn't do much harm anyway; the job is that much stronger." This is exactly the reverse of the case; the construction is *that much weaker*. The supporting members have to carry, not only the figured weight for which they were proportioned, but moreover have to carry dead, useless weight that is only limited in amount by the culpability of the contractor. This increases the actual stresses by the amount to which the contractor "piles on," as you call it, extra weight, and renders the structure that much weaker.

In an experience covering over 15 years, I have never yet found work to proceed with such rapidity, or such mutual satisfaction to honorable contractor and engineer alike, as when what the steel-man calls "general drawings" are made. If properly made, these show the structure (or its parts) assembled, and give leading, governing dimensions, not rivet spacing (your point regarding this latter is well taken; the specifications should be sufficient guide). But every bracket, every plate, however small, *all* connections should be shown, and their sizes given on the drawings. The number of rivets required for each joint should also be shown, and, another point that you bring up, the size of the holes for any bolted connections should be specified.

With general drawings furnishing this information, the contractor will be able to give a careful, accurate estimate, the time spent in the engineer's office on the drawings will be more than repaid by the reduction in cost that this work effects when it reaches the contractor, and last, but not least, the contractor knows exactly what he is to do and how he is to do it. I have never known any work, done upon this basis, to take as long to do as that for which, on account of a frantic desire to save time, incomplete details were furnished.

NIMMO BOUSH.

New York, Oct. 6, 1905.

Graduates of Mining Schools.

Sir.—The question of demand and supply of mining-school graduates, which Professor Christy did not really discuss in his original paper, but treated in his recent communication, is, after all, of rather minor importance. His views are quite in accordance with my own. I also agree fully with him as to the theoretical advantage of a limited number of mining schools of high efficiency. Yet I am doubtful as to deploring the growth of new mining schools of secondary character in local centers. The great schools at the principal centers are expensive.

The advantage of knowledge is so powerful that anyone seeking it should not be deprived of the chance. I feel sure that a good many receive instruction at the local mining schools, who would not obtain it otherwise. It may be argued that the money spent in the maintenance of such schools would be far more economically laid out in paying the way of their students through other and superior schools; but, practically, would that be done? I fear not.

The great essential in the engineer's instruction is what Professor Christy remarks: A foundation training, broad, deep and thorough, in mathematics, physics and chemistry; with that he needs litle else to become invincible. Each of those subjects is an essential support to any superstructure he may desire to build in the future. We look to the great mining schools to produce the men with that broad, deep and thorough knowledge in the fundamentals, who will become our great engineers of the future, but we ought to recognize the usefulness in subordinate positions, both to themselves and the industry, of the men who have received some instruction at the minor schools. In natural evolution are not the latter going to be American adaptations of the *Bergschule* of Germany, while the great mining institutes correspond to the *Bergakademie?*—a distinction which Professor Christy discusses. A. V. R.

New York, Oct. 16, 1905.

New Publications.

The Dolomite Formation of the Transvaal. By C. B. Horwood. A paper read at the meeting of the British Association at Johannesburg, Friday, September 1, 1905. Pages, 18. Illustrated. Size, 8½ by 6½ in. Paper. Johannesburg, 1905: Esson & Perkins.

Gold Dredging in California. By Lewis E. Aubury, State Mineralogist. Pages, 120. Illustrated. Size, 9 by 5¾ in. Paper. San Francisco, 1905: The California State Mining Bureau.

Contents.—History. Area of the dredge gravel. Geology. Agriculture. Yield for 1903. The dredge. Screens, sluices, etc. Crew of a dredge. Working cost. Prospecting and examination of conditions. Oroville district. Yuba district. Bear river district. Folsom district. Calaveras county. Plumas county. Shasta county. Trinity county. Siskiyou county. Dredge data.

Status of the Mesozoic Floras of the United States. (Second paper.) By Lester F. Ward (with the collaboration of Wm. G. Fontaine, Arthur Ribbins and G. R. Wieland). Monograph XLVIII. United States Geological Survey. Part I. Text. Pages, 616; size, 8¾ by 11½ in.; cloth. Part II. Plates, 119 full pages; same size; cloth. Government Printing Office, Washington, D. C., 1905.

Lead and Zinc Deposits of Virginia. By Thomas Leonard Watson. Pages, 156. Size, 9½ by 6 in. Cloth. Price, $1. Richmond, Va., 1905: Board of Agriculture and Immigration.

Contents.—Historical. Biblography. Uses of zinc. Production. The geographical and geological distribution of the lead and zinc deposits. Association of the

lead and zinc ores. General geology. The ores and associated minerals. Alteration of the lead and zinc ores. Paragenesis and association. Secondary enrichment. Mode of occurrence. The relations of the ores to the geological structures. Localization of altered ores. Description of the mines. General outline of the genesis of ore deposits. Genesis of ores. Economic considerations.

This is the first volume of a series on the mineral resources of Virginia to be published by the Geological Survey of Virginia. It is a useful treatise on an interesting subject which has not heretofore had much literature.

Proceedings of the American Institute of Electrical Engineers. Vol. XXIV. No. 9, September, 1905. Size, 6x9 in. Paper.

Contents: Time limit relays; duplication of apparatus to secure reliability of service. The high-power surges in electric-distribution systems of great magnitude; An experimental study of the rise of potential on commercial transmission lines due to static disturbances such as switching, grounding, etc. The constant-current mercury-arc rectifier. Data relating to electrical conductors and cables. Methods of measurement of high electrical pressures. Some comments on remarks made by Col. R. E. B. Crompton, before the International Electrical Congress at St. Louis. Three-phase traction. Heavy electric freight traction. Weight distribution on electric locomotives as affected by motor suspension and draw-bar pull. Choice of motors in steam and electric practice. Electrical features of block signaling. Limits of injurious sparking in direct-current commutation. A study in the design of induction motors. Limitations in direct-current machine design. A new instrument for measuring alternating currents. Synchronous converters and motor-generators. Water-powers of the Southwestern Appalachian system. A new induction generator. The development of the Ontario Power Co. A new carbon filament.

Tin Deposits of the World. By Sidney Fawns. Pages 240. Illustrated. Size, 6 by 9 in. Price, $5.50. Cloth. London, 1905: The Mining Journal.

Contents.—The common forms of stanniferous minerals and the early history of tin mining. Description of tin deposits. Alluvial tin deposits of the Malay peninsula. Alluvial tin deposits of Banca, Billiton, Siak, Sumatra, Siam and British Burma. Alluvial tin mining. Tin-lode deposits in the Malay peninsula. Tin deposits of New South Wales. Tin deposits of Queensland. Tin deposits of Tasmania. Tin deposits of Western Australia, northern territory of South Australia, New Zealand and Victoria. Tin deposits of Bolivia. Tin deposits of Cornwall. Tin deposits of Africa. Tin deposits of Europe and America. Mount Bischoff tin mine. Dolcoath tin mine. Tin crushing and dressing machinery. Dredging for tin. Methods of tin assaying. Statistics of tin production. Bibliography.

This work is a collection of the accounts of the tin deposits and methods of tin mining in all parts of the world, so far as they have been described in technical literature. The compilation appears to have been fairly well done, and the author is especially to be commended for the fullness of his references to original authorities. The book is essentially descriptive in its character, rather than analytical, and it does not go extensively into the geology or technology of the subject. It will, however, be useful to those who wish to investigate the occurrence of tin ore and the general conditions of its production.

Technical Methods of Ore Analysis. By Albert H. Low. Pages, 273. Illustrated. Size, 6x9 in. Price, $3. Cloth. New York, 1905: John Wiley & Sons.

The intention and scope of this work are amply indicated by its title. Its character is guaranteed by the name of its author, who has achieved high distinction and wide recognition in his profession. He has been a generous contributor to the pages of the journals devoted to analytical chemistry and has devised several methods of technical analysis, which have been of marked originality and recognized usefulness. Among these is the method of estimating zinc, known by the name of von Schulz & Low, which is probably in more general use than any other method.

The present work is designed to be a laboratory guide, describing the methods that are adapted to the cases most likely to be met in practice. Some remarks of the author in this connection are worth repeating. He says:

"It has been my aim to make the descriptions so minute and complete that if the operator will follow them exactly he can scarcely fail to obtain satisfactory results. But herein lies the difficulty. There seems to be a tendency among technical chemists *not* to follow directions exactly. In carrying out a method the alert operator sees a short-cut and takes it, or a "better way" occurs to him and he introduces it in the place of the one given. There would be no ultimate harm in this (since all methods fall short of perfection) if the operator would only take the time to investigate and determine the real value of his ideas. In some cases he might discover that his supposed improvement was spoiling a good method, and he would come to agree with the author of the method, who had himself probably gone over the same ground. I have seen methods of my own thus modified, and ideas hastily adopted whose incorrectness I had previously demonstrated by careful investigation."

The profession can well be grateful to Mr. Low for his preparation of this clear, precise and distinctly useful book. We predict for it a great success.

Questions and Answers.

Magnesite.

What is the amount and value of the magnesite production of the United States?

Answer—The production in 1903 was 3,744 short tons, valued at $10,595. The production in 1904 was 2,850 tons, valued at $9,298. In each year, the entire production was derived from the State of California. The values are computed on the basis of f. o. b. mines.

Tantalic Acid.

What is the market price of this substance Y. P. I.

Answer—Such minerals as columbite and tantalite are quoted at 50c. per lb. of contained tantalic acid, as shown by analysis. As this mineral runs from 20 to 50% of tantalic acid, the figures would reduce to 10c.@25c. per lb of the concentrated mineral, according to its grade and purity. The pure tantalic acid itself is quoted at 40c. per ounce.

Loading Gravel from a River Bed.

What is the cheapest and most practical way to load gravel from the spoil bank in a river bed to the tracks of a railroad on and parallel to the bluff? The distance is about 1,000 ft., horizontally, and the vertical lift 50 ft. At certain times of the year the spoil bank is covered by 20 ft. of water, but the operation will be carried on when the river bed is exposed and the gravel dry. A. T.

Answer.—About the cheapest and most effective device for this work is a modified cableway. The head-frame should be made of reasonably permanent construction, and located on the bluff so as to load directly into cars from the bucket. The tail-frame should be readily portable so as to be moved from place to place as the work proceeds. An anchorage may be provided by using tee-rails driven into the bank; or cribbed work, filled with gravel to give the necessary weight, may be built.

For ordinary purposes, an A-frame will prove an effective tail-frame; the sheave should be placed at the apex, and the frame inclined to lessen the pull on the anchorage. The bucket used may be of any of the many types made for rehandling ore and coal; these are usually known as "shovel buckets," and are effective when properly handled. The suspended cableway will have to be proportioned to the load which the bucket is to handle. Under such circumstances as specified it would require a single cable, from which the bucket should be suspended by a hoisting rope. The bucket should be raised and transported from the spoil bank by this rope; but to pull it back, a tail-rope is necessary, for which purpose the sheave (at the tail-frame previously mentioned) is provided. A double-drum hoisting engine

will give good results in operating a rig of this character.

The installation noted is about the cheapest effective form that can be devised for economical operation. Its cost depends upon the capacity and speed of operation desired, as well as upon local conditions.

Abstracts of Official Reports.

Consolidated Mercur Gold Mining Company.

This company's property is in the Camp Floyd mining district, in Utah. The latest report is for the fiscal year ending June 30, 1905. In this report, General Manager and Treasurer G. H. Dern states that 245,026 tons of ore were mined and milled during the year, an average of 20,419 tons per month and 671 tons daily; 79,703 tons, or 33%, was base and 165,323 tons, or 67%, was oxidized ore. This tonnage shows a material increase over the report of the immediately preceding year. The extraction averaged $2.97 per ton of ore treated; this shows an improvement of 11c. per ton, as compared with the former year's report. The tailings do not always remain uniformly low, the fluctuations being chiefly due to the variations in the character of the ore. However, the general average, of $0.98 per ton, shows an improvement over the work of the two preceding years. The Mercur ore is a rather complex one, and the company is experimenting along new lines to find a cheap, practicable method of obtaining low tailings. The average value of all ore treated during the year was $3.95 per ton, an increase of 6c. per ton over the former year's results.

The mining costs for the year, including prospecting, were $1.51 per ton. The milling costs were $1.12 per ton. Accordingly, the total operating costs of the company, including all expenses, except construction items, were $2.63 per ton. This is the lowest record for expenses that the company has ever made, the best previous report being $2.88 in 1903. The mining cost per ton shows an increase of 11c. over the preceding year's figures. This is due to re-opening the mine: driving into the caved stopes has been expensive, both for labor and timber. There have also been some extraordinary expenses for repairs. The milling costs, on the other hand, have shown quite a decrease, being 48c. per ton less than the former year. Economies have been effected in many departments, and especial attention has been paid to regulating the work according to the principle of intensified production. One dividend was paid by the company during the year, namely: Dividend No. 20, June 6, 1905, 2½c. per share, or $25,000.

Relative to the mill, the report states that this department is in good condition, so far as the machinery and general equipment are concerned. In the crushing department, no material change has been made; good results are being obtained in its operation. In the roasting department five furnaces are in operation, although at times only four were running. The furnaces now handle a larger tonnage than ever before, with far lower operating expenses, and with only a fraction of the repairs of former years. In the leaching department, particular care has been used in charging the ore into the leaching tanks, as well as in applying the solutions. The consumption of chemicals has been comparatively low, that of cyanide being 0.82 lb. per ton of ore. The slime plant, having been discarded, was removed.

The past year has been an important one in the mine, and the work has largely consisted in re-opening the older workings. Early in 1904 a considerable portion of the mine was caved, and had been abandoned as worked out; more recent operations showed that the caving of the various stopes was not due to exhaustion of the ore, but to faulty mining. The method of mining employed was not adapted to the Mercur orebodies, which range from 20 to 80 ft. in thickness. An attempt to mine such an orebody by means of stulls, even though the vein be taken in slices, or "subs," is wholly impracticable, and in some of the best stopes not over one-third of the ore was obtained before the country caved.

A great deal of prospecting in virgin territory was done during the past year, and much new ore was opened up; but a large share of the work was in going back into the old stopes, driving through caved ground with tunnel sets, preparatory to mining by the caving system. Such work took great quantities of timber. Furthermore, the drifts were not made large, so that they did not produce much tonnage. Again, in some stopes the cave drifts produced good ore, while in others the material was largely waste rock. From the foregoing it is natural that the cost of mining increased during the year.

In the preceding report, the ore then developed was considered to be admissible of profitable operations for at least two or three years, and that many new developments would be made; in this report the manager considers that the mine has at least twice as much ore in sight as was shown a year ago.

Under improvements and repairs, is noted the building of a new sampling mill, an extensive change in the large electric hoist, and retimbering in and around the Mercur mine.

As a result of the year's operation of the mills, the gross value of gold produced was $742,292; adding to this receipts from other sources, or $12,385, the total revenue amounted to $754,677. Deducting the operating expenses of $370,935 of the mine, $285,317 of the mills, and apportionments out of last year's unapplied balances of $1,974, the total operating expenses foot up to $654,278, leaving $100,399 as the net earnings for the year. The balance from the former report was $49,519, making the total available profits amount to $149,918.35, out of which was paid dividend No. 20, of $25,000, and the construction items of the mills of $2,406, leaving $122,512.24 as the balance of assets at the close of the year.

Tyee Copper Company, Limited.

The report of this Vancouver island mining and smelting company covers the year ending April 30, 1905.

Development has failed to reveal any extension in depth of the present orebody, the bottom of which has been found just below the 200-ft. level. Its lateral extent too has been ascertained, and of unworked ore only 250 ft. remains between the east boundary and the easternmost point of the mine; to the west, the vein pinches out, passing out of Tyee territory. The amounts, and the cost per foot, of development were as follows:

	Amount Done.	Cost per Ft.
Drifting	776 ft.	$6.72
Crosscutting	1,215 "	6.38
Raising	252 "	10.29
Sinking	352 "	30.23
Station cutting	123 "	27.83
Reopening caved drifts	658 "	8.48

The shaft has now reached 760 ft. and is still in green schist. The manager, however, is of the opinion, entertained by other authorities, that further orebodies will be found with depth.

From the six stopes, 22,640 tons of ore were removed during the year, in the course of which all but two stopes were exhausted; in the west stope, about 3,000 tons remain, but so close to the surface as to render removal impossible until later; No. 6 stope shows a width of 20 ft. at a point 60 ft. above the first level and is advancing into new ground. In all other parts of the mine, about 14,000 tons of ore remains untouched. Until new orebodies are found, extraction will be reduced to 2,000 tons per month, which, however, is sufficient to earn a profit; dividends have been suspended, awaiting the same contingency.

The Tyee ore had the following composition:

Copper	4.08%
Iron	10.49%
Zinc	7.36%
Silica	13.48%
Barium sulphate	37.63%
Lime	2.04%
Alumina	7.01%
Magnesia	Trace
Sulphur as sulphides	15.65%
Silver	2.67 oz.
Gold	0.131 oz.

The cost of extracting and shipping ore was less during the year than at any previous time. It consisted of the following items, in dollars per ton:

	Cost per Ton.
Stoping and hoisting	$1.156
Ore dressing	.040
Proportion for development	.425
Retimbering old workings	.034
Fuel	.048
Freight and hauling	.059
Transporting to E. & N. Ry. (aerial tramway)	.119
General charges	.189
Total costs	$2.070

The ore received by the company's smelter at Ladysmith comprised 48,826

tons (dry) of Tyee ore, of which 11.1% was briquetted, and 6,963 tons of custom ore and concentrate, the whole amount of ore smelted being 57,681 tons. In addition 1,928 tons of custom ore was used as flux.

Roasting was continued as in the previous year. Of the total smelter charge, 65.24% was roasted, the rest being smelted raw. The sulphur as sulphides, remaining in the roasted ore, averaged 6.32% for the lump ore and 4.84% for the ore and briquettes. Of the 37,633 tons of roasted ore, 14.7% was made into briquettes. The smelting furnace was in blast for 245 days and treated 14,183 tons of raw Tyee ore, 32,100 tons of Tyee roasted ore, 5,533 tons of roasted briquettes, and 7,343 tons of custom ore, a total of 59,160 tons of ore, besides 1,816 tons of flux, 1,588 tons of flue dust and 891 tons of slag and concretions. Of coke, 7,359 tons was consumed, being in the ratio of 1 coke to 8.63 of charge, as against 1 to 9.45 in the previous year. The ratio of concentration was 10.97 of ore into 1 of matte.

A three-months' trial was made of heating the blast on the principle of a long passage through tubes of comparatively low temperature, instead of a short passage through highly heated stoves, and the satisfactory results attained led to a proposed reconstruction of the blast heating apparatus. An average assay of slag from the dump was 0.41% copper, 0.14 oz. silver and a trace of gold. The flue dust carried 2.46% copper, 2.51 oz. silver and 0.09 oz. gold.

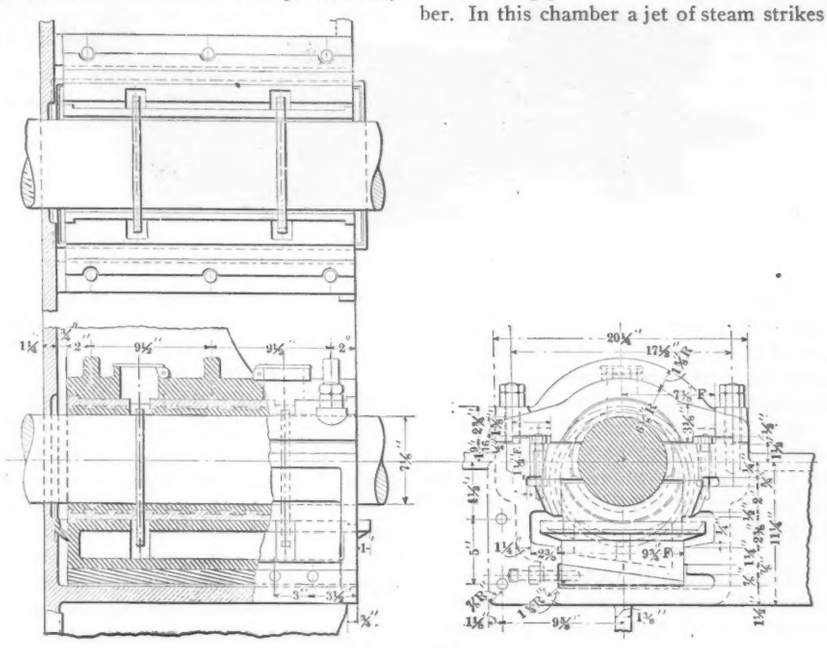
The smelter shipped 5,390 tons of matte, of the value (less refining charge only) of $825,950, an average analysis of which was 43.27% copper, 31.62 oz. silver and 1.85 oz. gold, besides 7.21% barium sulphide and 13.41% zinc sulphide; this was equivalent to a yield of 4.04% copper, 2.95 oz. silver and 0.182 oz. gold, a total value of $14.32 per ton of ore smelted. A permanent sampling mill was erected on the east side of the roasted ore bins, and was started Jan. 1. 1905.

Sales of matte, and other resources brought in £169,986. Expenses included: purchase of ores, etc., £23,243; mining, £37,337; smelting, £32,564; London office, £1,919; Canadian revenue taxes, £2,119; loss of exchange, £1,194; leaving a balance of £71,610 on the year's operations. Two dividends, totaling £27,000, were declared; one-fifth of the total expenditure to date for development was written off, as was also £16,698 for depreciation of properties and plant. Income tax absorbed £3,729 and "commission" to subscribers for second issue of stock took £6,400, leaving a surplus of £28,307 (including £14,350 from previous year) to be carried forward.

The consumption of electric current per capita is greater in Boston than in any other city of the world.

Rotary Blower Bearings.

A new system of babbitting the bearings of rotary blowers for smelting works has been introduced in connection with the Roots blower. The lower bearing, instead of being formed with babbitt on the lower box, is in an independent babbitted shell that fits the lower box and is concentric with the shaft on both surfaces. This allows an extra shell to be kept on hand,



ROOTS BLOWER BEARING.

with the assurance that it will fit any lower bearing on the blower, and by taking the weight of the shaft off the bearing, removing cap, taking out side blocks, shoving oil rings to either end, the old box may be taken out and new one substituted in a few minutes. The bottom and side adjustments may be made while the machine is running; the bottom without moving anything but the adjusting bolts, the side wedges by removing cap, and the cap by liners.

The bearing is shown in the accompanying illustration. The side adjustment is made by the small wedges shown on either side the shaft on the horizontal center line. These are set and locked in position by the stud bolts shown. The large wedge at the bottom is for adjusting that portion of the bearing, the cap being handled in the ordinary manner. The line of division between the bearing sleeve and the pedestal is plainly evident from the drawing.

This blower is manufactured by the P. H. & F. M. Roots Co., of Connersville, Ind.

Metallic chromium is deposited in the electrolysis of solutions of chromic chloride, if a high current density is applied. Electrolytic chromium may occlude as much as 250 times its volume of hydrogen. It is proposed to utilize chromium coatings industrially.

The Manufacture of White Lead.

F. Winteler, in the *Zeitschrift für angewandte Chemie* (1905, p. 1179), describes a process for the manufacture of white lead which is practiced at the works of the McDougall White Lead Company, Buffalo, and also at other places.

The lead is melted in cast-iron pots, from which it is conducted by a number of narrow pipes into a brickwork chamber. In this chamber a jet of steam strikes the pipes at an angle of 45°, causing the lead to scatter into a fine "sand." The product is screened, and the coarse lumps are sent back to be remelted. A charge of 1,500 to 2,000 kg. of this lead-sand is introduced into a rotating drum, and 80 kg. of 40% acetic acid is added in three instalments: the first portion on the third day; the second, two days later; and the remainder on the fifth day.

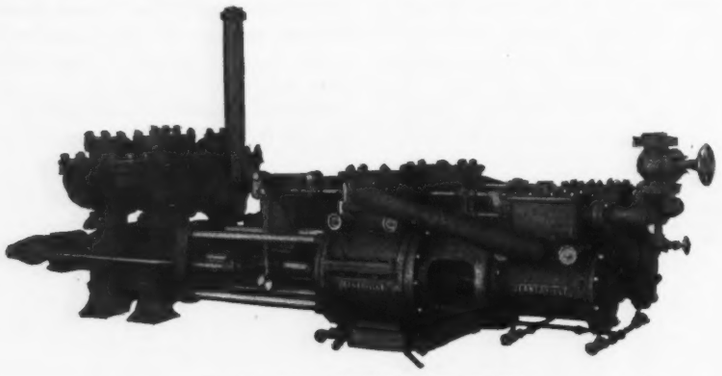
For seven days in all, the drums are kept rotating, while a mixture of air, filtered fire gases and a little steam is blown in continually. If the steam is too dry, a little water may be added. If the mass is very dry, the reaction proceeds too slowly. On the other hand, there must not be enough moisture present to form a paste. The waste gases are drawn off by a chimney.

A little unconverted lead balls together in the drum. After seven days the contents are taken out of the drum and are ground, with water, in a pug-mill. From this they run down a wooden trough provided with transverse riffles, similar to those used for gold washing. The grains of uncarbonated lead in the material are thus separated.

Next follows a treatment with soda in settling tanks. Finally the product is either dried, or else, while still moist, ground with oil and prepared for the market.

A Sectionalized Pump.

The illustration given herewith shows a new departure in pumping machinery. It is a compound condensing pump, having a capacity of 200 gal. per min., working against 950 ft. vertical lift; the design is such that it can be readily transported by muleback, as it is sectionalized and has no part weighing over 300 pounds.



JEANESVILLE SECTIONALIZED PUMP.

It is made by the Jeanesville Iron Works (Hazleton, Pa.), which reports that one of this pattern is in operation at the plant of the Compania Beneficadora Del Colcheno.

The Hunter Prospecting Drill.

Stanley Hunter, of the Department of Mines, Victoria, has designed a combined percussion and rotary drill, which weighs only a quarter as much as the percussion drills hitherto employed by the Department in prospecting auriferous deep leads, and is reported to effect a saving of 20 to 25% in drilling costs.

The machine comprises a three-legged derrick, two legs of which are made of steel. The mechanism for operating the drills is at the lower end of the base of the steel legs. The percussion motion is given to the rods by a revolving cam, the stroke varying from 1 in. to 13 in. There are three-speed winding drums for heavy rods, and a high-speed sand-pump drum is connected with the percussion mechanism. When a core of rock is required rotary motion is imparted to the rods by a worm wheel. The whole mechanism is driven by a portable 5-h.p. oil engine. A principal feature in the machine is that the derrick carrying the apparatus can be lowered upon wheels for transport. The driving engine has also been fitted on wheels, and in this way is used for traction purposes. With the ordinary machine the time occupied in dismantling, transporting, and re-erecting, usually occupies from six to eight days; but Mr. Hunter claims that his machine may be lowered, shifted to another boring site, re-erected, and boring re-commenced in one day. The plant is capable of boring to about 500 ft., and the total weight of the mechanism and complete outfit is about six tons. It will bore to any size up to a diameter of 8 in. According to the *Australian Mining Standard*, the Mines Department recognizes that the plant will be the means of facilitating the work of boring in alluvial country, and it has been decided by the Department to commence work with the machine on the hard basalt overlying the lead at Trentham.

The American Mining Congress.

The eighth annual convention of the congress is called to meet at El Paso, Texas, Nov. 14 to 18, inclusive. The call is issued by J. H. Richards, of Boise, Idaho, president, and James F. Callbreath, Jr., of Denver, Colo., secretary. An interesting program and entertaining excursions are promised. For detailed information, address should be made to the American Mining Congress, Denver, Colo.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Oct. 10, 1905.

801,199. PROCESS FOR THE PRODUCTION OF METALS OF THE ALKALI GROUP BY ELECTROLYSIS.—Edgar A. Ashcroft, Weston, via Runcorn, England.

801,200. HYDRAULIC CLASSIFIER.—Howard S. Bailey, Denver, Colo.

801,204. METHOD OF AND APPARATUS FOR TREATING COAL, ORES, AND OTHER MINERALS FOR DRAINING THEM OF WATER.—Fritz Baum, Herne, Germany.

801,229. METHOD OF CASTING METALS.—James Eaton-Shore, Rugby, England, assignor to Willans & Robinson, Ltd., Rugby, England.

801,268. CLOSING DEVICE FOR GAS-RETORTS.—Robert Reister, Dessau, Germany, assignor to Dessauer Vertikal-Ofen-Gesellschaft M. B. H., Berlin, Germany.

801,274. PROCESS OF CONVERTING STEEL-SCRAP INTO IRON.—Edward M. Schulz, Sergeants Hall, and George W. Helmlinger, Pittsburg, Pa.

801,296. PROCESS FOR THE PRODUCTION OF MOLDED BLOCKS OF SILICON CARBIDE.—Friedrich Boelling, Frankfort-on-the-Main, Bockenheim, Germany, assignor of one-half to Chemisch-Electrische Fabrik Prometheus, G. M. B. H., Frankfort-on-the-Main, Bockenheim, Germany.

801,317. PROCESS OF PRODUCING SHELL-POWDERS.—Joseph P. R. James, Muscatine, Iowa.

801,318. REHEATER FOR FURNACE-GASES.—Henry Howard, Brookline, Mass.

801,339. COMPOUND FOR HARDENING OR CASE-HARDENING IRON OR STEEL.—Gustav Reininger, Berlin, Germany, assignor to the firm of Cyanid-Gesellschaft mit Beschraenkter Haftung, Berlin, Germany.

801,347. WATER-COOLED FURNACE-VALVE.—Francis H. Treat, Pittsburg, Pa.

801,349. ORE-SEPARATOR.—Lois J. Vandervoort, Guthrie, Okla.

801,378. MANUFACTURE OF ARTICLES FROM FUSED MATERIAL.—Edward Hart, Easton, Pa., assignor to General Chemical Company, New York, N. Y., a corporation of New York.

801,380. APPARATUS FOR ELECTROSTATIC SEPARATION OF SUBSTANCES OF DIVERSE ELECTRIC SUSCEPTIBILITIES.—Charles H. Huff, Brockton, Mass.

801,453. MOLTEN-METAL CONDUCTOR FOR CUPOLAS, ETC.—Carmi L. Glover, Newcastle, Pa.

801,465. COMBINATION MINER'S CANDLESTICK AND MATCH-SAFE.—John B. Lindahl, Colorado Springs, Colo.

801,470. PROCESS OF TREATING PRECIOUS-METAL-BEARING MATERIALS.—Charles W. Merrill, Lead, S. D.

801,480. WATER OR AIR FEED SIDE-INLET DRILL-BIT.—Charles H. Shaw, Denver, Colo.

801,483 and 801,485. PROCESS OF MAKING CAMPHOR.—Karl Stephan and Paul Hunsalz, Berlin, Germany, assignors to Chemische Fabrik auf Actien. (vorm. E. Schering), Berlin, Germany.

801,500. APPARATUS FOR MAKING STEEL.—Frank E. Young, Canton, Ohio.

801,572. PULVERIZING-MILL.—John H. Davis, Glens Falls, N. Y.

801,583. COAL-CUTTING MACHINE.—William E. Garforth, Richard Sutcliffe and William Buxton, Wakefield, England.

801,592. PULVERIZING CENTRIFUGAL MILL.—Lehigh Hunt and Walter W. Wheeler, Iola, Kan.

801,646. APPARATUS FOR PREPARING INGOT-MOLDS FOR THE CASTING OPERATION.—Hugo Carlsson, Stockholm, Sweden, assignor of one-half to James H. Le Fevre, Buffalo, N. Y.

801,656. PROCESS FOR THE DEOXIDATION OF INGOT-IRON, INGOT-STEEL, ETC.—Richard Eichhoff, Essen-Rüttenscheid, Germany, assignor, by mesne assignments, to Elektrostahl Ges. M. Beschr. Haft., Remscheid-Hasten, Germany.

801,702. DREDGING-CUTTER.—Samuel S. Wyer, Columbus, Ohio.

801,703. COAL-WASHING APPARATUS.—John Anderson, Peoria, Ill.

801,803. COAL-WASHING APPARATUS.—Robert L. Martin, Jr., Pittsburg, Pa., assignor to Pittsburg Coal Washer Company, Pittsburg, Pa., a corporation of Pennsylvania.

801,820. PROCESS OF EXTRACTING TIN FROM TIN-LEAD ALLOYS.—Carl A. L. W. Witter, Hamburg, Germany, assignor to the Straits Trading Company, Ltd., Singapore, Straits Settlements, India.

801,828. SHAFT-SINKING APPARATUS.—Eduard Frieh and Rudolf Noellenburg, Nordhausen, Germany, assignors to Deutsche Tiefbohr-Aktien-Gesellschaft, Nordhausen, Germany, a corporation of Prussia.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Sept. 30, 1905.

18,660 of 1904. ORE SEPARATION.—A. de Bavay, Melbourne, Australia. Separating blende from gangue in zinc tailing and concentrate, by making use of surface tension of water; the tailing is passed gently upon the surface of water, the surface tension being sufficient to support the blende but not the gangue.

24,238 of 1904. WHITE-LEAD PROCESS.—Heyl & Co., and A. Wultze, Charlottenburg, Germany. In the process for making white-lead by treating acetate of lead with carbonic acid, using dilute solutions of the acetate, and working with the carbonic-acid gas under pressure, so producing a white-lead that is not crystalline and of greater covering power.

14,333 of 1905. ARRANGEMENT OF ELECTRIC FURNACE.—P. Girod, Paris. Improved way of arranging crucibles in electric furnaces, so as to utilize the heat in the most economical manner.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Fred. G. Farish is at present in Montana, on professional business.

Mr. Percy E. Barbour, of Boston, is in Cananea, Mexico, on professional business.

Mr. Percy L. Fearn, of New York, has returned from a professional trip to Utah and Idaho.

Mr. José M. Botello, the wealthy mine-owner of Parral, Mexico, is in New York, on his way to Paris.

Mr. John Seward, of New York, is examining the properties of Wm. Benton at Indé, Durango, Mexico.

Mr. B. B. Thayer, assistant to President H. H. Rogers of the Amalgamated Copper Co., is in Butte, Montana.

Mr. Richard Keller, manager of the Emma Gold Mining & Milling Co., Dunton, Col., is visiting Denver.

Dr. F. D. Adams, of McGill University, has declined the position of director of the Dominion Geological Survey.

Mr. John J. Case, manager of the smelting works of the Cerro de Pasco Mining Co., sailed for Peru on Oct. 7.

Mr. H. H. Knox has arrived in London, where he is occupied with the business of the Caucasus Copper Company.

Mr. A. Chester Beatty was at Bingham, Utah, a few days ago and is at present at Ouray, Col., on professional business.

Mr. Clarence B. Wisner, manager for the Montana Zinc, is in Butte again, after an absence of several weeks in the East.

Mr. L. B. Carpenter, of Basin, Mohave county, Arizona, was in Denver last week on his way to the Cripple Creek district.

Mr. Joseph A. Coram, who has been looking after his Butte interests during the last two weeks, has returned to Boston.

Mr. Jay P. Graves, general manager of the Granby Consolidated Co., of Grand Forks, B. C., has left Spokane for New York.

Mr. John Gill, of Edinburgh, has been elected chairman of the Arizona Copper Co., in place of Sir William Menzies, resigned.

Mr. Frederick Grundy, of Los Angeles, Cal., has gone to the southern part of Mexico. He expects to remain there for some time.

Mr. R. L. Edward, manager for the Kittie Burton Co., operating a gold property at Ulysses, Lemhi county, Idaho, is visiting Butte.

Dr. Adolphe Chalas, a French expert, is in Toronto in the course of a tour undertaken to invesigate the mining possibilities of Canada.

Mr. F. A. Heinze, of the United Copper Co., in Butte, Mont., is in that city again, after an absence of two months in Europe and New York.

Mr. D. H. Bradley, Jr., has left Philadelphia for Chihuahua, Mexico, to take charge of some mining properties for Philadelphia capitalists.

Mr. Henry Hay, manager of the Witwatersrand Deep, left London for South Africa Sept. 14, after spending a vacation in England and the United States.

Mr. M. A. Walker, one of the officers of the Alice Mining Company, who lives in Salt Lake, is in Butte on business connected with his Montana interests.

Mr. Walter Vaughan Morgan, maker of the Morgan crucibles, and proprietor of the *Ironmonger*, has been nominated as Lord Mayor of London for the coming year.

Mr. C. W. C. Sample, of New York, sailed for Peru on Oct. 14. He is to be connected with the smelting works of the Cerro de Pasco Mining Co., in that country.

Mr. Frank H. Probert, of Los Angeles, Cal., has been a recent visitor in New York. He left *en route* for Mexico, Oct. 16, where he will make some mine examinations.

Mr. Kuno Doerr has been appointed manager of the Aguascalientes (Mexico) plant of the American Smelting & Refining Co., in place of Mr. O. A. Westlund, resigned.

Mr. Charles Janin, mining engineer, of the firm of Janin, Stebbins & Smith, of San Francisco, has completed examination of mines at Leads, Colo., and is now engaged in Oregon.

Mr. E. C. Knight, manager of the Monterey plant of the American Smelting & Refining Co., has also been assigned to the management of the new Velardeña plant of the same company.

Dr. Franklin R. Carpenter left Denver last week on a professional trip to Canada, being called there for consultation as to the introduction of pyrite smelting in a new and promising district.

Mr. Benjamin B. Thayer, assistant to the president of the Amalgamated Copper Co., and Mr. John D. Ryan, managing director for the company, with their families, have been visiting the Western mines of the company.

Mr. W. R. Ingalls, editor of THE ENGINEERING AND MINING JOURNAL, will leave New York for British Columbia, Oct. 21. He will remain in British Columbia about a month and will visit Butte, Salt Lake City and Denver on his way home.

Mr. Edward Lightcap, of Fort Smith, Ark., general manager of the Sans Bois Coal Co., with mines at Sans Bois, Ind. Ter., has resigned his position, to return to Chicago and enter the coal business there. He has been at Fort Smith about two years.

Mr. Otto Saeger, of Rosdzin, Upper Silesia, director of the zinc smelting works of the Georg von Giesche's Erben, one of the large smelting works of Upper Silesia, has arrived at New York. He will visit the zinc- and lead-smelting districts of the United States.

Mr. Walter S. Dillon has resigned his position as general manager of the American Mexico Mining & Developing Co., at San Lorenzo, Coahuila, Mexico, and has been succeeded by George E. Fitzgerald. The latter is now in full charge of the mines and smelter of the company.

Members of the American Institute of Mining Engineers have presented to President Shaughnessy of the Canadian Pacific, a solid-gold fob, richly enameled, as a mark of appreciation of courtesies received when they traveled over the Canadian Pacific lines, on their trip through the West, last summer.

Mr. H. B. Sturtevant, formerly manager of the Pioneer iron mine on the Vermillion range, has been appointed superintendent of the Lincoln Consolidated Mining Co., of Tucson, Ariz., and has already purchased machinery for the equipment of the properties, which have been in the prospect stage until now. These properties consist of 39 claims, and carry silver-lead, copper and gold values. The Twin Buttes Mining Co. is to continue its projected road to these mines. Mr. Sturtevant will act also as consulting and general mining engineer, with headquarters at Tucson.

Obituary.

Joseph Henshaw, formerly secretary of the Majestic Copper Mining & Smelting Co., and well known as a hotel manager, died at Salt Lake City, Oct. 1.

A despatch from Hermosillo, Mexico, dated Oct. 16, says that John C. Anderson, a resident of Boston, Mass., who has been in Mexico for several years looking out for his extensive mining interests, has been murdered by Yaqui Indians. Edgar J. Jones, an American mining engineer, who was with him, was also killed. The two Americans made a hard fight for their lives, killing five of the Indians.

John Veith, the retired general mining superintendent of the Philadelphia & Reading Coal & Iron Co., died at his residence, Pottsville, Pa., on Oct. 8. He was in his 74th year. He was a native of Rheinpfalz, Germany, and arrived in New York in 1850. A few days later he went to Middleport, Schuylkill county, Pa. He became a mine foreman, and later he was made superintendent. In 1878, under Franklin B. Gowen, then president of the Reading, he was made general manager and superintedent, which position he held until Dec. 31 last, when he was retired on full pay.

Societies and Technical Schools.

Society of Chemical Industry, New York Section.—The first meeting of the session will be held at the Chemists' Club, 108 West 55th street, New York, on Friday evening, Oct. 20. Chair taken at 8:15. The program for the evening will be: "Account of the annual meeting in London, and visits to the English sections of the society."

Organ Mountain Mining Association.—This association has been organized at Organ Mountain, N. M., the object being to "advance the development of the Organ Mountain and adjacent mining districts. The following officers were chosen: President, J. I. McCullough; vice-president, Col. John Hegan; secretary, Dr. J. H. Johnson; treasurer, John H. May.

University of Wisconsin.—During January, Mr. Bailey Willis, of the United States Geological Survey and Carnegie Institution, will present a course of 12 lectures in the Geological Department of the University of Wisconsin, on the subject of "Continental variations with special reference to North America." The course is given primarily for students making geology a major study, and is open to such students not regularly registered at this University.

Lake Superior Mining Institute.—A circular from the secretary's office, dated Oct. 10, says that arrangements have been made by which members will have to pay only one and one-third fares for the round trip to Iron Mountain from all points on the ranges; also from Chicago and Milwaukee. Members are requested to register at the Commercial Hotel on arriving. The following program has been arranged for the meeting:

Tuesday, Oct. 17—The morning will be spent in visiting the Chapin and Pewabic mines. At 12 o'clock noon special train will leave for Florence mine, then to Crystal Falls, where the balance of the afternoon will be spent in visiting the mines. At 8 o'clock P. M. the evening session will be held in the court-house at Crystal Falls. At 11 o'clock P. M. special train will leave for Iron Mountain, Vulcan and intermediate points.

Wednesday, Oct. 18—Train will leave Crystal Falls at 7 o'clock A. M. for Iron Mountain, leaving Iron Mountain at 8:30 A. M. for Vulcan, returning at 3:30 P. M. and proceeding to the Traders mine, and from there returning to Iron Mountain in time for supper. At 8 o'clock P. M. the evening session will be held at the court-house at Iron Mountain. At 11 o'clock P. M. trains will leave for Crystal Falls and Vulcan, so that members living on the range may return home.

Thursday, Oct. 19—Special train will leave Crystal Falls at 7 o'clock A. M. and Iron Mountain at 8:30 for Escanaba, where the day will be spent, visiting the crushing plant, coal docks and other points of interest. There will also be a trip to Gladstone to visit the Pioneer Iron Company's furnace. Special trains will leave Escanaba for Ishpeming in time to make connections with train No. 7 for the Copper Country, Gogebic Range and Duluth. The special train for Menominee Range points will leave about 9 P. M.

The following is a partial list of papers to be presented at the meeting:

"Cargo sampling of iron ore received at lower lake ports—including the methods used in the analysis of the same." By W. J. Rattle & Son, Cleveland, Ohio.

"Notes on some recent changes in the equipment of the Republic mine." By Frank H. Armstrong, Vulcan, Mich.

"Methods of iron ore analysis used in the Lake Superior iron mining district." By W. A. Siebenthal, Republic, Mich.

"Rateau exhaust steam regenerator system." By L. Battu, Chicago, Ill.

"Card system of accounting for mine supplies." By W. M. Jeffery, Duluth, Minn.

The titles of other papers to be presented were not received in time for this announcement.

Trade Catalogues.

"The Advantage of Fall Painting" is a flyer issued by the Joseph Dixon Crucible Company.

The United States Portable Cribbing Co., Scranton, Pa., sends us its pamphlet on sectional cribbing.

The Michigan Pipe Co., Bay City, Mich., is sending out a folder descriptive of its steam-pipe casings.

The Marine Manufacturing & Supply Co., New Brunswick, N. J., requests manufacturers' catalogues.

The Buffalo Forge Co., Buffalo, N. Y., sends us its booklet descriptive of punches, shears and angle-iron cutters.

The Union Elevator & Machine Co., Chicago, Ill., sends us flyers describing the various products made by it.

"Properties of Saturated Steam," according to Peabody, is a post-card table, issued by the De La Vergne Machine Co., New York.

The Potter mesh separator is described in the new catalogue of the Potter Separator Co., Newburgh, N. Y.; it is standard 6 by 9 in. size.

"De Laval Steam Turbine Machinery" is a flyer issued by the De Laval Steam Turbine Co., Trenton, N. J., describing its apparatus in brief.

The Armstrong stocks and dies are illustrated and described in the new catalogue of the Armstrong Mfg. Co., Bridgeport, Conn., just received.

The American Safety Lamp & Mine Supply Co., Scranton, Pa., issues its new catalogue of safety lamps, aneroid barometers and mine supplies.

The Standard Machinery & Supply Co., 503 Rialto Building, San Francisco, Cal., requests catalogues of manufacturers of mining and other machinery.

The rock drill leaflet of the Ingersoll-Sergeant Drill Co., is a brief account of this firm's machinery for that purpose. The company has removed to 11 Broadway, New York.

Manila rope pamphlet No. 059 of the C. W. Hunt Co. is now being distributed. It is of smaller size than the regular publications of this company, and therefore more difficult to bind with them.

The Detroit Lubricator Co., Detroit, Mich., sends us its new catalogue of lubricators, oil pumps, gauge glasses and general steam fittings. The catalogue is of standard 6 by 9-in. size, well illustrated.

The Electrical Testing Laboratories, New York, send us a reprint of Clayton H. Sharp's article, descriptive of its equipment. The article was printed in the *Electrical World and Engineer* in January, 1905.

F. Weber & Co., Philadelphia, Pa., send us descriptive leaflet of the "Sphinx" tape splice. They have also issued their new catalogue of engineers' and artists' materials, which is now ready for distribution.

The *Nernst Central Station Bulletin* for September, and the leaflet describing the Nernst 220-440, three-wire alternating current system, are both received. They are published by the Nernst Lamp Co., Pittsburg, Pa.

Leaflet No. 145 and Bulletins No. 355 and 357, of the National Electric Co., Milwaukee, Wis., are at hand, as is also the new bulletin No. 51. The bulletins refer to belt-driven generators, Christensen air-brake equipments, and ratings and dimensions of this company's machines, respectively.

Industrial.

The American Car & Foundry Co. has recently added to its equipment at the Madison plant, Granite City, 100 Boyer long stroke riveting hammers, manufactured by the Chicago Pneumatic Tool Co.

The David Bell Engineering Works, Buffalo, N. Y., reports the sale of a number of steam-hammers to the U. S. Government, for use at Panama, and at the Boston, New Orleans and Mare Island navy yards.

The Hercules Mining Co., at Wallace, Idaho, recently installed at its mine one of Hulm's tramway brakes, made by the Vulcan Iron Works, of Seattle, Wash.

Manager Harry L. Day reports that the device is a success.

The H. D. Crippen Manufacturing Co., New York agent for the Denver Engineering Works, has just taken an order for two large double-drum hoists for the Palmillo mines, at Parral, Mexico, owned by Don Pedro Alvarado.

Mr. Joseph Cawley, formerly of James Bonar & Co., Inc., and the Pittsburg Feed Water Heater Co., has assumed the position of vice-president of the Cadwallader Tin Plate & Metal Co. This company is smelter and refiner of all grades of terne metals, solders, babbitt metals, etc., with office and works in Pittsburg.

The Wallace Contracting Co., of Duluth, Minn., has dissolved partnership, Mr. Geo. Wallace retiring. Mr. Wallace, who was for some years general manager of the Fayal Iron Co., has taken up his residence at Detroit, where he is sinking a deep shaft for salt mining. Messrs. Roberts and Kingston remain at Duluth, and are carrying on the company's business on the Mesabi range.

John A. Traylor, of Denver, reports the following sales: Complete Hodge jig equipment to the United States Smelting Co., of Utah; the Hercules Mining Co., and part equipment for the Bunker Hill & Sullivan Mining Co. The Imperial ore screen manufactured by him in Denver, to V. M. Braschi & Co., of Mexico; El Paso Foundry & Machine Co., St. Helens Smelting Co., Manchester, England, and the Sulphur Mining & Railroad Co., in Virginia.

The Alberger Condenser Co., New York and Chicago, announces that it has recently acquired the entire Wainwright business, and will hereafter manufacture and sell the well-known Wainwright feedwater heaters and expansion joints. These specialties have lately been manufactured by the Taunton Locomotive Manufacturing Co., Taunton, Mass., which is now going out of business. William R. Billings, formerly treasurer and general manager of that company, has become connected with the Alberger Condenser Co. and will be in charge of the Wainwright business under its new ownership.

The Chicago works of the Sullivan Machinery Co. has shipped to the Centennial Copper Co. a hoisting engine of the direct-acting type. It consists of two 36 by 60 in. simple, reversible Corliss engines of the heavy-duty type, connected to a straight-faced drum, 15 ft. in diameter by 15 ft. winding face. The drum is grooved for 1⅜ in. wire rope, and is keyed direct to the engine shaft. The plant is designed to hoist from a vertical depth of 5,000 ft. at the rate of 4,000 ft. per minute, with a boiler pressure of 150 lb. The reverse engine is of novel design, and may be operated by either steam or air. The brake mechanism is arranged for steam, hand or gravity operation, with independent control in each case. The main throttles are on the cylinders, moved by hand from the engineer's platform, which is elevated. The dial indicators are provided with fast- and slow-moving pointers.

Construction News.

Salisbury, North Carolina.—C. G. Viele, of this place, is reported to be in the market for a crushing plant.

Breckenridge, Colorado.—A cyanide plant is to be put in at this mine. S. F. Stoughton is lessee and manager.

Richfield, Utah.—The Gold Development Co. expects to put in another air-compressor. M. F. Murray, Richfield, is manager.

Nederland, Colorado.—A mill and electric plant are to be put in at the Boulder County mine. C. F. Lake, of Nederland, is manager.

Caribou, Colorado.—The St. Louis mill is to be increased from 20 to 75 tons daily capacity. A. F. Haberle, Caribou, Colo., is manager.

Zacatecas, Zacatecas, Mexico.—Munoz & Garcia, of this place, have obtained a concession and will build a cyanide plant near this place.

Rollinsville, Colorado.—A 10-stamp mill and a concentration plant are to be put up at the Smuggler mine. C. Horning, Nevadaville, Colo., is manager.

Wall Street, Colorado.—An air-compressor, boiler, engine and other machinery are to be put in at the Good Morning tunnel. F. G. Shaeffer is manager.

Idaho Springs, Colorado.—The Tawasasa Gold Mining & Cyaniding Co. is planning a large mill and cyanide plant. R. E. L. Townsend, Idaho Springs, is manager.

Ulysses, Lemhi County, Idaho.—The Kittie Burton Mining Co. intends to rebuild, as soon as possible, its 30-stamp mill, which was destroyed by fire Sept. 14.

Knoxville, Tennessee.—The Wm. J. Oliver Coal & Land Co., composed of Wm. J. Oliver and associates, of this place, will develop 5,000 acres of coal lands in Campbell county.

Nighthawk, Okanogan County, Washington.—The Favorite Gold & Copper Mining Co. has decided on installing an air-compressor and machine drills. A Leyner compressor plant is talked of.

The Nighthawk Mining Co. is considering the installation of a power drilling and ventilating machinery plant.

Colorado City, Colorado.—Interests identified with the United States Reduction & Refining Co. have been informed that the mill belonging to it at this place will be enlarged to a capacity of 600 tons per day.

Tintic, Utah.—The Mammoth Mining Co. intends to put in an aërial tramway, one mile long, to carry ore to the railroad. Samuel McIntyre is president; his office is in the Hooper building, Salt Lake City, Utah.

Jamestown, Colorado.—The Monarch Consolidated Mining Co. intends to put in a cyanide plant. An electric plant, driven by water power, is also to be installed, and a steam plant—engine and boiler—will be needed.

Kansas City, Missouri.—The Pyramid Portland Cement Co. will erect a plant for the manufacture of that product. The property comprises 120 acres of argillaceous limestone deposits, underlaid by a 20-ft. bed of shale.

Troy, West Virginia.—Oil wells are to be drilled near this place on property owned by a newly organized company, of which B. F. Rosenbloom is president and Robert McWhinney is secretary; both of Homestead, Pennsylvania.

Clifton, Arizona.—Contracts for the construction of the concentrator and other buildings for the Arizona Copper Co. have been let to the American Bridge Co. for about $50,000. There will be 400 tons of material in the building.

Duluth, Minnesota.—The General Electric Co. has taken contracts from the Oliver Iron Mining Co. to equip the latter's Queen and Fayal mines with electric haulage. At each mine there will be one 100 kw. generator and a 14 by 30 Corliss engine.

Magdalena, Sonora, Mexico. — The Black Mountain Mining Co., owned by Chicago and Duluth capital, is to double its mill and electrical installation. It is now erecting stamp mill and complete mine plant, with electrical power and transmission, of 100 stamps, has a 20-stamp mill in operation, and will put in 120 stamps more. The company has medium grade gold property on Cerro Prieta, near Magdalena. N. C. Banks, formerly with the Westinghouse Electric Co., is in charge of operations and the head office of the company is at Chicago.

East Kootenay, British Columbia.—The steel trestle to take the place of the wood trestle destroyed by first last March at the Crow's Nest Pass Coal Co.'s Coal Creek colliery, and its equipment with modern tipple and other coal-handling appliances, is now so far advanced as to admit a preliminary run of the new plant. This permanent steel structure is to supply Nos. 1, 5 and 9 mines, on the North side of Coal creek, and Nos. 2 and 3, on the south side. It is approximately 900 ft. in length. Present provision is for an output capacity of about 4,000 tons daily, but the structure is designed for an eventual extension to 8,000 tons per day. The estimate of cost of construction and equipment, when the contract was let to Heyl & Patterson, of Pittsburg, Pa., last April, was about $200,000.

Special Correspondence.

New York. Oct. 18.

While the mining industry in general is prospering, and mining everywhere shows growing activity, the dominating feature at present seems to be copper. In California, Arizona, Utah, Montana and in the old Lake Superior region, copper mines are being actively worked and new mines opened.

In California the opening of copper properties, the erection of smelters and the extension of the older mines are making the copper output of the State a prominent feature. Outside of this work, the dredging industry is attracting especial interest. The recent combination of some of the large dredging companies has not interfered with other new enterprises of the kind, and new ones are constantly being brought forward. This form of gold recovery is replacing the hydraulic and drift mining, formerly so prominent. Another point of interest is the new prospecting going on in old districts, especially in the southern part of the State. This is due to the discoveries in Nevada, which have drawn attention to the so-called desert section. Thus the old Panamint country is drawing many prospectors and miners, and promises to show renewed activity, after a long rest.

In the new Tonopah and Goldfield districts in Nevada some large mines are being developed. There are signs there also of coming consolidations, which will bring this field practically under control of a few large companies.

Arizona continues to show growth in copper production. The chief interest just now is in the Bisbee district, where the large expenditure in opening new mines is beginning to show results. Several of these mines are ready, or almost ready, to join the Calumet & Arizona in the producing list. In other districts work is active, and it is very possible that Arizona may, before long, pass Montana as a producer.

In Montana, the Butte district shows steady development in the older companies. A movement to consolidate and develop some of the smaller mines, by the organization of two or three new companies, is taking shape. It is probable that two or three of these may become factors of importance in the district.

The Cœur d'Alene district in Idaho continues active. Some interesting developments in the older mines are reported, and production shows no signs of decrease.

The copper mines of Utah and the growth of the smelting interests continue to be the chief points of interest in that State. While the improvements planned by the Utah Copper Co. are delayed by litigation, there is no doubt that they will finally be made. The Bingham district is the center of great activity.

The Leadville district in Colorado is increasing its shipments on the lines indicated in this column a month ago. The larger production following the unwatering of the mines in the Down-town section of the camp is being followed by other sections, notably in Iowa gulch and on Carbonate hill. In Cripple Creek lessees on many of the mines are getting good results. The September production reached a total of $1,846,000, and still larger results are looked for in the later months of the year. The project for the second drainage tunnel is taking definite shape.

Interest in British Columbia just now centers chiefly in the new extensions which the Canadian Pacific and the Great Northern companies are building. These lines will make possible the exploitation of many mines which cannot now be worked profitably on account of the high cost of fuel and supplies, and the difficulty of shipping ores. This is notably the case in Lardeau, the Slocan and the Similkameen country.

In the Yukon, the miners hope for large results from the proposed plans of the Government for the regulation and improvement of water supply. This supply is a vital point in the Klondike, where new development has rather halted this season.

In the Lake Superior copper country the main feature is in the plans of the Calumet & Hecla Co. for extending its operations. These plans are outlined in another column. Other developments continue, both in the older mines and in the new exploitations.

Iron mining naturally shows great activity everywhere. The shipments from the Lake Superior ranges up to Oct. 1 this season were 25,473,606 tons, the largest ever reported. The Oliver Iron Co. and other large interests on Mesabi range are planning extensions and the purchase of new machinery and equipment on a very large scale. Exploration work is also being pushed, especially on the western end of the Mesabi range. The old ranges are not behind, and new ore docks are to be provided at Marquette, to handle larger shipments. An interesting point is found in the proposed large use of electric power in the mines and on the railroads of the Mesabi.

In the East the mines of the Champlain district are being worked more actively than for a long time; and the same is the case in the Chateaugay and other districts in the northern Adirondacks. The old mines at Fort Montgomery and other points in the Hudson River district are being re-opened. In New Jersey also several old mines are to be worked again.

The progress of consolidation in the coal mining interests of Indiana and Illinois continues. This tendency is leading gradually to many changes, such as the concentration of work on larger mines, and the probable abandonment of smaller and less profitable workings. The probabilities of a strike of miners in the West next spring continue to be discussed, though no new light has been thrown on the situation. A strong effort is being made to organize the operators in the West, to put them in better position, in case of a conflict.

In the anthracite coal region the principal news is the absorption of the Coxe Brothers & Co., the largest independent interest, by the Lehigh Valley Co. Here also the strike question continues under discussion, but nothing new has been brought out.

In Eastern Canada the Cobalt excitement continues, and the northern section of Ontario is still overrun by prospectors anxious to do as much work as possible before winter sets in.

San Francisco. Oct. 10.

What is known as the Blue Ravine region, a short distance above Folsom, in Sacramento county, was more or less mined near the American river, both by hydraulic and drift, in the early days of California, but was finally given up and ranchers and stockmen took possession. Subsequently several companies were organized to sink shafts and drift the deeper ground further back from the river where the pioneer miners had done nothing. This later work paid well, in several instances after shafts were sunk to bedrock, a depth of about 80 ft. The Blue Ravine and Gray Wing properties especially, were very profitable. For the past two years, however, these companies have not been so successful, the ground not being as rich as that heretofore worked. The Blue Ravine Co. has recently come into good ground again. Now, however, it is proposed to dredge certain portions of this ground, near the end of the ravine close to the river, where the bedrock is not so far from the surface. It is thought that by dredging, the whole of the ground may be satisfactorily worked; whereas by the drifting system only 6 to 8 ft. of the gravel nearest bedrock has been handled. Expert dredge men are now examining the tract.

At White Rock, El Dorado county, two miles from Placerville, the Blackiston property has been sold to Eastern men who will not only work it for gold, but also for precious stones. Quartz crystals of fine variety are found in this vicinity and it is hoped to find diamonds. In this connection it may be stated that the lapidaries of this city and State are to endeavor to revive the precious-stone cutting industry in this State and throughout the country. They will ask Congress for higher duties on precious and semi-precious stones.

A 400-ft. tunnel to cost $15,000 is to be cut at a horseshoe bend of the Trinity river, near the mouth of the South fork of that stream. The waters of the river are to be turned through this tunnel, leaving about two miles of the bend dry and

in condition to be mined. About 180 ft. of the tunnel have been already cut.

The miners, carmen and muckers of Grass Valley, to the number of 400, have organized a branch of the Western Federation of Miners, and it is expected that the entire membership will ultimately exceed 1,000. All employees of the mines except clerks and bosses are now members of the union.

It is expected that very extensive development work will be undertaken at the Dairy Farm mine in Placer county, this winter, which property has been taken over by the Guggenheims, who are now the owners of the Selby Smelting Works. The Dairy Farm produces copper, gold and silver, but is considered one of the new progressing copper mines of the State. A number of other properties of the same character in western Placer county are beginning operations.

More damage suits have been filed against the Selby Smelting Co. by ranchers of the Benicia district, asking for compensation for loss of cattle and grain. In the Deming suit, which is considered a sort of test case, the Selby company in the demurrer complain that Deming's charges are not specific, that he does not state facts sufficient to constitute a cause of action, and that the complaint itself is in places unintelligible.

In September, 1900, the Wildman Gold Mining Co., of Sutter creek, Amador county, executed a certain deed of trust as security for indebtedness to Charles R. Bishop. Default having been made in the payment the land is to be sold on Nov. 18 to pay the amounts due on the promissory notes specified in the deed of trust. The properties to be sold include the Wildman quartz mine, the Wildman company's reservoir site, the Hector, Reserve, Prize, Nadir, Hilltop, Enhanced and X-Ray quartz mines, and also other mining properties of the Wildman Gold Mining Co.; certain water rights, pipe lines and rights of way. The mills, machinery, tools and appliances at the mine are to be included in the sale.

The suit of the Gambetta Mining Co., at Grub Gulch, Madera county, against W. L. Smith, to quiet title, has been decided in favor of the plaintiff, but the case is to be appealed.

In the recent rich finds in Masonic district, 14 miles from Bodie, Mono county, ore assays from 12 mines run from $26 to $112, mostly in gold, with some silver. The principal claim is the Pittsburg, where a 2-ft. vein of $200 rock has been opened, and another of 18 in. of nearly the same value has been cut. This mine is owned by Dorsey, Phillips & Bryan. The property which created the first excitement in the district is the Jump Off Jo, or as it is now called, the Field of Gold Mining Co. Great dikes of quartz are on the surface of the claim, cropping up 20 to 25 ft. The True Friend group consists of three claims owned by Caleb Dorsey, Dr. Krebs and associates. The Grace Elmer, owned by Edward Elliott, shows up a wide ledge. El Paso and El Mono are adjoining claims, owned by John Sawyer and others of Bridgeport. The Bonanza, owned by Dr. Burfeind, of Bridgeport, is being developed by a tunnel. The Washington is owned by Geo. Delury and the Hanover by John Smith. Among other claims being opened are the Josie, Billy Drue, Arcade and Baby Jim. Some hundreds of locations have been made.

Paradise, Ariz. Sept. 26.

Satisfactory conditions prevail throughout this camp and development work is being pushed all along the line. Beginning at the eastern end of the district, the Savage Gold & Copper Co. has made its reported change from white to Mexican labor, has increased its force from 9 to 15 men and is pushing the development of its property. On the eastern side of the mountain, a distance of about 300 ft. in the adit has been driven. A winze is is being sunk 250 ft. from entry, which is down about 30 ft., and sulphide ore has been encountered carrying about 30 oz. of silver, about 4% copper and some gold. In the 100-ft. shaft on the west side of the mountain, a crosscut has been run through the ledge at the 50-ft. level and has 16 ft. of good ore. The company contracted with an El Paso company for a smelter, the contract calling for the erection of the plant, to be turned over in running order and it is now waiting for the man to arrive to erect it, as the machinery is all upon the ground, the foundation graded and ready. J. A. Lewandowski, the manager, reports the property as looking well.

At the Cochise Consolidated Copper Co. work is steadily progressing. The shaft is close to the 200-ft. mark, and an adit is being driven in on the zinc ledge.

At the Chiricahua Development Co. rapid development continues; the new 150-h.p. boiler has been installed. This boiler should be in commission the coming week. On the 400-ft. level in the drifts and crosscuts are several bodies of good looking ore. It is reported that 15 men will be added to the force, which would give a crew of about 60.

At the Manhattan Development Co. work continues to progress at both ends of the property, and is showing up some high-grade ore.

At the Copper Range property they are still at their assessment work, and on one of the 40 claims have opened up a body of high-grade sulphide ore.

At the Duluth & Chiricahua Development Co. assessment work for the year 1905 has been completed, and application made for patent on the property. Owing to three of the claims having been jumped, it looks as though they would have a long drawn out lawsuit.

At the town of Paradise matters are rather quiet. George Walker is just completing the erection of water-works as a fire protection for the growing town. It is operated by a powerful windmill which pumps the water into a tank upon the side of the hill.

Bisbee. Oct. 10.

Active exploration is now under way in all the properties of this camp, both the Calumet & Arizona group and Copper Queen. In the Calumet & Arizona there have been big finds within a week or two. In the south part of the Senator claims, on the 1,050-ft. level, ore is now being blocked out in quantity. This apparently dips toward the north, and comes out of the Lowell claim of the Queen mines. On the 1,150-ft. level No. 20 crosscut has been run into Buckeye ground and No. 29 started off it, and there is about 90 ft. of ore running from 7 to 18% at the ends of these, with the breasts still in ore. On the Mag claim, 400 ft. higher than ore had before been found or mined, some recent exploration work has found bodies of ore indicating that the possible depth of the mineral-bearing ground is greater than has been supposed, and it may even come to surface.

On the Lake Superior 1,000-ft. level, new orebodies have been cut in 31 crosscut the past week, but little is yet known of their dimensions or extent.

In Duluth mine there have been new and large finds of late, and the property is much improved. These finds are on the 1,250-ft. level and are nearly all in the Sunnyside claim, where the bulk of the mine's workings have been. A drift is started from near the Congdon shaft of this mine toward the Hope & Wagner claims. This mine is now hoisting ore regularly for the smelter at Douglas, and it is supposed that the furnace which is to smelt its product, as well as that of the Lake Superior, will be ready soon.

In Pittsburg mine, which has been sinking its Briggs shaft for more than two years, the bottom has now been reached and a station is being cut on the 1,120-ft. level, from which drifts will be run to orebodies known to exist. A winze that was being sunk from the 910-ft. level to connect with one of these drifts has been started no less than three times, in an effort to get it in ground firm enough to stand. It is now going down satisfactorily. The Hoatson shaft of this mine is progressing well. A drift from the Junction on its 900-ft. level, to the Pittsburg ground, has now passed the line by 20 ft. and is in ore all the way.

In Junction, the circular drifts around the shaft on the 900 ft. have made about 250 ft. progress with its connections, and of this more than 100 ft. is ore. It has been found by the work on this level that the main contact between lime and porphyry dips away very sharply to the northeast, which not only gives Junction more and better mineral ground than anyone hoped, but is a fact of the utmost

interest to its neighbor, the Denn-Arizona. This dip is very pronounced, and Junction shaft, which a few hundred feet above was all in porphyry, is now some distance from it, and is surrounded by ore and leached ground, indicating more ore below.

Denn is sinking at the rate of 125 ft. per month from the beginning, and should be into orebodies before February next.

Saginaw has cut ore in small seams on the 350-ft. level, and miners are now following it to see of what importance it may be.

Calumet & Arizona production for the month was 2,700,000 lb. of copper; Copper Queen's was 6,750,000 lb., making the camp total 9,510,000 lb.

Shattuck's new find on the 700-ft. level was predicted by Superintendent Pattison about a week before it was made. It is along a radiating fault plane, and is an important discovery, running about 10% copper.

At Jerome, three diamond drills are working; one on the Jerome Development Co.'s ground, north of the United Verde, one on the Pfau, and the other underground in the Verde Chief. None of the various Jerome properties have yet found the continuation of the United Verde oreshoot, and the theory that it is a chimney holds.

The Arizona Smelting Co. is already buying ores for its new $1,000,000 smelter, which is to be running in three months.

No. 8 furnace of the Copper Queen was blown in lately; it has 300 tons daily capacity. More furnaces are under construction. The Queen is now taking custom ores and the silver from Nacosari concentrate, while the copper from the latter still goes to Globe. The Queen is sinking a shaft on its Cuprite claim, some 2,000 ft. from the Shattuck, and is down 125 ft. Another 200 will be added. There are nearly 1,000,000 tons of old smelter slag at Bisbee, from the former Queen smelter, and the work of breaking this up and shipping it to Douglas is now started. It contains an average of 2% copper and is excellent for fluxing. Shipments will be at the rate of about 1,200 tons a week for the present.

Denver. Oct. 13.

From present appearances, the American Steel & Wire Co. will make an aggressive fight for the nail and wire business of the West, and enter into more active competition with the Colorado Fuel & Iron Co. than has been the case. The former concern is owned by the United States Steel Corporation.

James Doyle has secured 2,000 shares of Portland stock, which seems to have been held by J. F. Burns, and which, on examing the books, proved to be owned by the former, who received it when making a formal demand and will probably thereby gain a strong point in his suit with Mr. Burns.

The United States Reduction & Refining Co. is erecting a test plant at its Colorado City works, where a new application of the cyanide process will be tried. If successful, the company will be able to lessen the cost of reducing ores.

By Dec. 1, it is expected that the Denver, Northwestern & Pacific railroad will be running trains into Denver over its own tracks. A freight depot, costing about $50,000, will at once be built and used temporarily as a passenger station also.

A peculiar shipment by express was made from this city, a few days ago, of a mine cage weighing about 1,200 lb.; it was manufactured by the Denver Engineering Works; the order was received by wire from Don Pedro Alvarado, of Parral, Mexico.

A party of engineers has lately been surveying for a railroad across Cameron pass, a short distance north of Rollins pass, where the Continental divide is crossed by the Moffat line. The line commences at the Fort Collins terminus of the Colorado & Southern railroad, and the plan seems to be to build to Boise, Idaho, and to be run for the Colorado, Wyoming & Idaho Railroad Co. If this plan should be carried out, it would greatly assist in the development of the mineral resources and coal lands in North Park, which is now distant from railroad communication.

Leadville. Oct. 10.

The output from the camp is steadily on the increase and for the month of September 79,500 tons of ore were hoisted from the different properties; an increase over the preceding month of 1,500 tons. The increase is due to the heavy tonnage of zinc that is being sent out; from the Moyer 9,500 tons were shipped and from the Western Mining Co.'s properties 7,000 tons.

The outlook for the future is bright, as several new undertakings are on foot in the outlying districts, and the present demand for iron has started up a number of properties that have been idle for several months. The Tuscon is sinking and will send the shaft down another lift of 400 ft. to open up the body of ore that was found by the diamond drill; it will be the first of the year before the ore is reached. Chicago people have taken hold of the Long & Derry, and it is the intention to do considerable work.

Adelaide park is again the scene of much activity, and the old Park shaft has once more started. In this property there is a body of iron, both high and low grade, and it is the intention of the present lessees to mix the two and make a fair shipping grade of ore. The Humboldt, near the Park, is shipping 15 tons daily of a very fair grade. At the Flagstaff prospecting is being carried on at the 470- and 530-ft. levels, in both of which small streaks of ore have been found.

The lessees on the Nevada, South Evans, have been driving lately on a small streak of ore at the 200-ft. level, which recently opened out into a fair-sized body, from which three cars are being shipped daily. The adjoining property, the Ollie Reed, is doing considerable work with the diamond drill at No. 2 shaft, and about 50 tons a week are being shipped from No. 1 shaft.

A good strike has been made on the Winchell mine, Mosquito range, where a body of ore was opened 20 ft. from the surface, running well in gold, and 60 tons were shipped inside of a week. The claim belongs to the New York group and is near the London. The New York and Moffat tunnels are being driven ahead. From the Birdseye section of the range good ore is being shipped from the France lode. The property is above timber-line, and next spring it is the intention of the lessees to come down the hill and start a tunnel to cut the veins at greater depth. Sullivan & Burkhardt, from their group of claims, recently shipped 200 tons, which were taken out by pack train to the nearest railroad point; the values are not given out. This is the first shipment made in twenty years.

With the demand for iron and zinc a number of properties on Fryer hill have resumed work, among them being the Tom Sargent, belonging to the Little Pittsburg Co., which has been idle for seven years; the shaft will be repaired to the 300-ft. level and also the drifts, and from this point work will be carried on in the orebodies. Below this claim is the Hayden, and it has also resumed work. The new shaft recently sunk on the New Discovery opened up, at a depth of 100 ft., a good body of iron, and the lessees are now shipping 25 tons daily. Between 15 and 20 tons daily of high-grade lead ore is being shipped from the McCrea shaft.

Shipments have been slightly increased lately from the Reindeer, and now 100 tons daily are being sent from the mine, also from the Dome shaft, as the lessees on the north end have opened the same ore-shoot as the company did to the south; from the Murphy shaft about 40 tons daily are being shipped. The President, further to the south, is prospecting with the diamond drill from the bottom of the shaft, 350 ft., and the results so far are encouraging. The Columbia is shipping 30 tons daily, and the Nil Desperandum is in iron in both drifts.

Butte. Oct. 10.

A new company is being organized in Butte for the purpose of taking over several mining claims and fractions in the southeastern part of the city. Mining in that section has been in progress quite a while, and many of the claims are yielding copper-silver ore of good quality, but no great depth has ever been attained on any of the properties except the Belmont, a United Copper plant, and the Glengarry, also owned by that company. Nearly all of the good ore extracted has come from

between the surface and a depth of 200 ft. The Glengarry shaft is 800 ft. deep, and there is no ore of value in the bottom. Operations on it were suspended several years ago. The Belmont is 1,000 ft. deep, and the lower workings are not yielding ore in commercial quantity. All of the property which the proposed new company intends to take over is south of the Pennsylvania, a Boston and Montana mine.

The Pitsburg & Montana Copper Co. will begin making copper the latter part of this week, provided its new blower works all right. It has 700 tons of matte ready for the converters, and is adding to it at the rate of 50 tons per day. Its blast-furnace is treating 240 tons of crude ore per day. Manager Baggaley says the company's output of copper will be 15 tons per day while the matte on hand is being treated. Plans for the contemplated primary furnace of the Baggaley process are being drawn, and within a few months the plant will be equipped with one of these furnaces. The company will begin sinking its new shaft next week. It will be sent down 1,200 ft. and connected with the other shafts from the bottom. Bedrock is only 50 ft. deep at the point where the shaft will be put down, and the vein of the Silver Bow mine crops there.

The disabled hoisting engine at the Diamond mine, one of the Amalgamated hill group, is raising ore, but only one side will be used. The company expects to be able to hoist almost the full regular output of the mine with one side for about two weeks, when the other side will have been repaired. The daily output of the Diamond is 800 tons. All other mines of the company are giving up their customary quantity of ore, about 10,000 tons per day.

Salt Lake City. Oct. 10.

The September output from the Cactus mine in Beaver county, which is operated by the Newhouse Mines & Smelters Co., was a record breaker. Between 500 and 600 tons of crude ore per day were handled and 55 cars of concentrate were sent to the smelters at Salt Lake City. The concentrate is said to run from 10 to 12% copper.

During the present week the Columbus Consolidated, of Alta, marketed a high-grade lot of ore, about 425 tons, which sold for a little over $46,000. The ore came from the 100-ft. level of the winze sunk from the main working tunnel. The winze is being sunk to the 200 level.

Litigation is likely to occur over claims in the town site of Alta in the Little Cottonwood mining district. Recently, Roy Bemis, well known in Utah mining circles, discovered what he believed to be vacant mineral ground within the town limits of Alta and accordingly made some locations. The town site, with the exceptions of the lots sold, belongs to the Walker estate. Bemis will probably undertake to do assessment work soon; then trouble in the courts is anticipated. Alta is one of the oldest mining camps in Utah.

The Boston Consolidated mine, of Bingham, continues to market from 200 to 300 tons of ore per day, and Manager Hanchett is authority for the statement that the property was never in a better physical condition. The development of the porphyry belt is progressing very favorably through the several tunnels, and in some of them the great mass of ore that is being opened up shows around 3½% copper values.

Preparations are under way for the resumption of operations upon an extensive scale at the property of the Shawmut company in Bingham. The mill is to be remodeled and placed in commission. The principal shareholders of the company are located in Boston.

Spokane. Oct. 10.

Never before were prospects in the Cœur d'Alenes so good as they are this fall. Three thousand miners are now at work in the various silver-lead mines in that district, and it is expected that the output of the mines this year will reach a value far in excess of any former annual record. The big silver-lead producers are maintaining a large output, and a number of smaller properties are active. In the north side properties, near Murray, Idaho, several concentrators have been erected during the year. The discovery of high-grade ore in the California has given renewed confidence to the operators on Nine Mile creek. Experiments with zinc ores from the Granite mine at the Success mill are reported to have been successful. Lack of water caused trouble during the summer and the early fall, but bountiful rains in the past two weeks filled the dams and enabled the concentrators generally to resume work again.

The White Cross Mining Co., owning the mine of the same name, near Moscow, Idaho, held a meeting recently in Cleveland, O., when arrangements were made to resume operations. It was decided to drive a tunnel lower down the hill, and to open the property at depth, before making any efforts to instal new reduction machinery.

The Conquest, near Newport, Wash., reports a strike of 4 ft. of copper ore at a depth of 420 feet.

Mining men who are interested in the old Metalline district, near Box cañon, on the Pend d'Oreille river, Stevens county, Wash., have secured the assistance of Senators Piles and Ankeny, in efforts to have the cañon opened by the Government. Officials at Washington, D. C., have promised to give the matter immediate attention.

Stockholders in the McKinley Mining Co., operating at Lucile, Idaho, have received reports from a recent mill test. Five hundred tons of ore are reported to have yielded $63 per ton free gold, and $42 per ton in concentrate. The ore was from the 400-ft. level.

The Mother Lode, owned by the Concord Mining Co., in Buffalo Hump, is reported as having made a strike of 20 ft. of $10 ore.

The Panhandle Smelting Co., of Spokane, which expects to start its lead furnace on Lake Pend d'Oreille, Idaho, this fall, is developing some promising lead properties in that camp. On the Minerva, two 900-ft. tunnels are being driven, which should cut the ledge from 700 to 800 ft. deep. One tunnel is in 625 ft. and the other 425 ft. A car shipment of silver-lead ore, made to the Tacoma smelter, netted $40 after paying costs of freight and treatment. The company is also developing the Venezuela mine. The Union iron works, of Spokane, are completing a crusher for the smelter; new railway scales and trestles are being erected.

Burch & Burbidge, of Spokane, have been operating a large gold dredge on their Crane Flat property, in eastern Oregon. It is closed down for the season. Fred. Burbidge, who was well known as manager of the Bunker Hill & Sullivan mine, says that the run was short, as the dredge started late; but the results are satisfactory and the outlook is for a profitable season next year. There is another dredge in Oregon working on the John Day river—and there is a good deal of placer mining, despite low water.

Duluth. Oct. 12.

Arrangements have been completed for opening the new St. Paul mine of Corrigan, McKinney & Co., which lies 10 miles west of Hibbing in section 23-56-23. It is to be underground, and the machinery has been ordered. It is hoped to make considerable shipments next year. This property was explored three or four years ago, and is under a traffic contract with the Great Northern road. Corrigan, McKinney & Co. are lessees of the Stevenson mine, which has made enormous shipments for the past few years. But this mine is approaching a time when it cannot continue such annual tonnage as it has made, and new developments are necessary if the company is to maintain its Mesabi business on a large scale. It has been the chief independent shipper from that range.

In the Monroe & Tener stripping for the mill operations, ore has been uncovered over a considerable area. The pit is very large, including a big area south of No. 3 Tener and No. 2 Monroe shafts, and is being widened all the time. The underground electric tramming system that has been installed is now ready for operation, and a large pumping plant is being put in on the 265-ft. level. This can handle 5,000 gallons a minute, which is expected to be sufficient. North of the shafts is a large part of the mine which is to be opened by the caving system, and worked all the

year. The mine has been laid out in the method adopted by the Oliver Co. for its newer large mines, and is a model property, as well as a very large one. It can be made to produce 1,000,000 tons a year, if desired.

The Pillsbury-Bennett-Longyear interests, on the western Mesabi range, are to re-open the Pearce mine and will ship some ore this fall. This was operated by Joseph Sellwood, of Duluth, under lease, but was abandoned last year in favor of other mines he held. O. B. Warren will have charge, and it is expected that mining operations can begin about Nov. 1. The Pearce is a small mine, but contains good ore.

Six large boiler and engine plants are to be installed by the Oliver Iron Mining Co. during the coming winter. The company is putting in several large pumping plants of the Prescott water-end pattern.

The Hibbing shops of the Oliver Co. are being equipped with Westinghouse electric power for the various tools that are going in. The shop is being equipped to handle any class of heavy mine machinery, as well as locomotives and steam shovels.

Tobin and Caspian mines, of the Menominee range, are growing very rapidly in importance, and are sure to be among the large mines of the district. Tobin has just installed a complete machinery outfit, including new boiler and power plants, new hoists and new shaft equipment. A complete electric tramming equipment is now being added and is to be ready in January.

A drill that has been working at the Rolling Mill mine for Jones & Laughlins has been transferred to the Gaffney tract, at Negaunee, for Pickands, Mather & Co., making three working there now. The Cleveland firm has a year's option on this tract and will explore it thoroughly.

The Cleveland Cliffs Iron Co. has three drills working in the valley between its Maas and Negaunee mines, and four more in the Swanzey district. At the Rolling Mill they are sinking a shaft to get at ore that has been located for some little time.

A third shaft has been started by the Oliver Co., on the Canisteo mine at Bovey, on the western Mesabi, making two that are developing ore. No. 1 is employed pumping the large volume of water that makes there.

The Chicago, Milwaukee & St. Paul road has begun work on the ore dock it is to have in readiness for next year's business. This is to be larger than its No. 1, built three years ago, which was good enough for business then, but is now too low for the bigger ships of the day. It was 66.5 ft. high, and contained 240 pockets of 210 tons each. The new dock will be longer, 3.5 ft. higher, and will have 300 pockets of 250 tons each, giving it storage for 75,000 tons. It will consume about 7,000,000 ft. of timber and will cost $500,000. The South Shore dock, at Marquette, will have pockets of the same height and capacity, but not so many of them, and its capacity is to be 50,000 tons. The total storage of this road's dock system is only about 55,000 tons theoretically, and in practice is much less, so that it has been hampered in the conduct of its ore business. The higher of its two docks is but 47.25 ft., making it impossible for the road to load any of the modern ships. The docks were not in the best of condition, and loading was a slow operation. It is probable that the Northwestern will build a new dock at Ashland, and the Duluth, Missabe & Northern one at Duluth.

Indianapolis Oct. 14.

A deal has been completed by which the Vandalia Coal Co., incorporated three months ago, and now the owner of numerous mining properties in this State, will have a controlling interest in the Indianapolis Coal Co. John A. George, president and general manager of the company, will be retained. A. M. Ogle, who is at the head of the Vandalia merger, said the company would secure a controlling interest in at least one local company in all good coal consuming cities.

The McNeely Brothers, of Odon, Ind., have organized a strong coal company, and have leased the McCarter mines, 5 miles east of Odon. The work of improving the mines and working them will begin at once.

The Indiana Supreme Court has decided that where a coal company, by requiring its drivers to open the doors of air-ways, and hold them open while passing through, created danger of injury to such drivers, the practice was a violation of the mining statute, and incurred liability to the injured driver.

The Wabash Coal Mining Co., of West Terre Haute, has incorporated with a capital stock of $25,000. The company has leased coal lands in Vigo and other coal bearing counties, and will sink shafts at once. Wm. F. Wagner, J. B. Mulliken and E. L. Sweet, incorporators.

There is danger of a coal famine in some portions of Indiana because of the delay in furnishing cars. The dealers are much concerned, and the operators say they are unable to get cars to carry coal away from their mines to fill orders. The operators say that, even when cars are furnished and loaded, the roads are unusually lax about direct shipments. The mines that own their own cars report their inability to get them back as soon as they are empty. The query is, whether the condition claimed to exist is not an evil for the State Railroad Commission to correct.

Calumet. Oct. 14.

Recent departures by the Calumet & Hecla Mining Co. from its traditional policy are of great significance. For many years the Calumet & Hecla has adhered strictly to the policy of developing its own property and enterprises directly dependent upon it. Therefore it is not surprising that its recent expansions have caused discussion.

Extensive purchases of land in Keweenaw county have been chronicled in the JOURNAL, but the latest expansion is in another portion of the Lake Superior copper region. Negotiations have been completed whereby the Calumet & Hecla acquires control of the property of the Superior Copper Co., south of Portage lake. A sale has been effected and papers have been signed. There remain only a few minor details to complete. The Superior Copper Co. is capitalized for $2,500,000, in 100,000 shares of $15, each. Of this amount, 10,000 shares have been issued; 46,000 shares remain in the treasury to be apportioned among the original owners of the land, and 44,000 shares to be sold. According to the terms of the agreement between the two companies, the Calumet & Hecla may purchase the 44,000 shares, and it has the privilege of ultimately acquiring 50,000 shares or more, giving it control.

The Superior property is located in section 15, immediately south of the Atlantic and Baltic mines, and the workings are on the Baltic amygdaloid lode. General Manager James MacNaughton and Chief Engineer E. S. Grierson, of the Calumet & Hecla, visited the Superior this week, accompanied by President Reginald C. Pryor, of the Superior, and by Judge E. B. Hinsdale, of New York, who effected the sale of the property. Development work will continue for the present by the Superior Co. under direction of the Calumet & Hecla management.

This deal is regarded as one of the most important made in the Lake district in a number of years, as it means unlimited capital for the development of the Superior property. The recent activity of the Calumet & Hecla management in acquiring new properties and developing latent resources of its older holdings holds forth great possibilities for the future. Included in the purchases south of Portage lake are more than three miles of frontage on Lake Superior, extending from a point one mile northeast of the Atlantic stamp mill toward the Portage lake ship canal. This tract furnishes an excellent site for a stamp mill if the company should ever require such a plant to supplement its extensive milling facilities at Lake Linden.

Current report is to the effect that the Calumet & Hecla plans further additions to its already extensive holdings in Keweenaw county, where it now owns more than 90 square miles of territory. While there is no official confirmation, it is rumored that the company is negotiating for an option on the Phœnix property, and plans diamond-drill exploratory work on the tract, if satisfactory arrangements can be made. The Phœnix mine is opened on the St. Clair and West fissures, and has been closed down since the ex-

haustion of the company's funds a few months ago. It is too far westward to carry the Kearsarge formation at workable depth, and the only bedded lode that is known to traverse the tract is the Ashbed.

It is evident that the Calumet & Hecla has exercised the option which it held on the Central mine, also in Keweenaw county, as the latter company is being liquidated. The Central, in the early days of the Lake copper industry, was a famous producer, yielding excellent profits, and it is possibly traversed by the northerly extension of the Kearsarge amygdaloid bed.

Developments on the Delaware property, which is owned by the Calumet & Hecla, are far more important than is generally believed. A number of blasts have been put in the lode exposed by the pit on the bank of the Montreal river, and the rock thrown out is heavily charged with copper. The copper is heavy, being in the form of nuggets and barrel work, and some of the rock resembles conglomerate, while other pieces look like amygdaloid.

It has been decided by the Calumet & Hecla management to resume operations in No. 14 shaft of the branch of the mine on the Osceola amygdaloid. Preparations toward this end have been started, and mining should be well under way in a month. The foundation of the hoisting engine has been reinforced. Pumps will be put at work unwatering the shaft, and connecting workings and the shafthouse will be opened. Probably six drills will be placed in the underground openings at the start, that number having been used at first in both Nos. 13 and 16 shafts. There are now 22 drills in use in No. 13 shaft, while in No. 16 shaft 9 drills are operating.

That the Calumet & Hecla company is securing satisfactory results from its Osceola workings is evident from its policy of gradual expansion at that branch of the mine. No. 13 was reopened 18 months ago. It is shipping rock averaging 1% copper. No. 16 shaft was placed in operation last spring. There still remain two idle shafts on the Osceola lode, No. 15 and No. 17, situated south and north, respectively, of No. 16. It is expected that work will be resumed in No. 15 in a few months, or shortly after No. 14 gets into commission successfully. By that time the portion of the Hecla stamp mill now being reconstructed will be finished, and there will be additional milling facilities available. In its present work on the Osceola lode, the Calumet & Hecla management follows a different method than was practiced when the mine was first opened in 1897 and the following years. Then drifts were driven in a straight line from the shafts, while now they are made to conform to the course of the lode, twisting and turning, which results in the lode values being constantly in sight.

Platteville, Wis. Oct. 12.

The Eclipse Mining Co. is an organization controlled by local capital. It is reported that it has just opened up a rich body of disseminated zinc ore. The shaft is down to a depth of 125 ft. The manager is preparing to crosscut to determine the width of the lode. The mine is fully equipped with the necessary hoisting and pumping machinery, and is located within the city limits of Platteville. The company is making preparations for the erection of a modern concentrating plant.

The Dall Mining Co. has shipped $15,000 worth of ore since the roaster was repaired. It is reported on reliable information that the company will be in position to pay its first dividend when the receipts are received from the smelter. Previous to the installation of roaster and magnetic separator, the company was unable to market its ore at a profit.

The Enterprise mine, owned by the Platteville Lead & Zinc Mining Co., declared a $15 dividend last week. The mine is now richer than at any time in its history. Recently the company acquired several adjoining leases upon which some valuable orebodies have been developed. The Dall mine is one of the best developed in the district, and has an orebody of good grade, averaging 125 ft. in width. The company has distributed this year $45,000 in dividends, and has paid out $12,000 for the purchase of real estate and improvements. The total investment in machinery, real estate and equipment amounts up to about $40,000. The total dividends paid by the company since its organization amount to $85,000. The original investment was $20,000, divided into 500 shares.

The Horseshoe Mining Co. has been organized to re-work the old Cincinnati mine, in the British Hollow camp. The directors are Frank Fisher, W. Ray and F. Hoppe, of Plattville, Wis.; W. H. Thomas, of Potosi; and W. Kendall, of Lancaster.

The Beacon Light Mining Co., composed entirely of local capital, has taken a lease on the Rundell land, just north of the city of Platteville. The lease is located on what is believed to be a continuation of the range upon which the Acme Mining Co. has opened a valuable zinc deposit.

The Gritty Six Mining Co., of Meeker's Grove camp, contracted during the past week for about $20,000 worth of new work. The 100-ton concentrating plant is being removed from Dutch Hollow to the Red Dog mine.

The Sally Waters Co. reports having distributed its second monthly dividend, amounting to 1¼%. The manager states that the company is in the market for a roasting and magnetic separating plant.

Scranton. Oct. 16.

Judge Wheaton, of the Luzerne county court, has declared unconstitutional that portion of the mine-labor law, passed at the last session of the Pennsylvania legislature, which provided that all minors employed in the anthracite mines above the age of 16 years, and in the breaker above the age of 14 years, should file an employment certificate showing that they had passed an educational test. In an exhaustive opinion he points out that this provision does not afford all members of that class in similar situations the equal protection of the law. It deprived certain members of the class of a vital property right, to wit, the right to labor in or about the anthracite coal mines, without due process of law. He held that the fourteenth amendment of the Constitution expressly prohibited such an interference. This will, beyond any doubt, settle this controversy, especially in view of the fact that there is already a tacit agreement that the proviso should not be placed in operation.

As foreshadowed in the JOURNAL last week, the Lehigh Valley Railroad Co. has acquired the valuable coal properties of Coxe Brothers & Co., including their many collieries, the Delaware, Susquehanna & Schuylkill railroad; the Allied Water Co., the Oneida Water Co. and the Drifton Water Co. It is said that the consideration was $20,000,000. The Coxe interests are to take bonds for the amount of $12,000,000, leaving the rest to be marketed by the Lehigh Co. The latter will take possession on Nov. 1. The Coxe lands are estimated to contain about 70,000,000 tons of coal.

There are some portions of the anthracite region where a series of lectures on "Conciliation" would be of practical value. Two days ago 1,000 men were thrown out of work because a young Hungarian employed as a "patcher" at No. 5 mine of G. B. Markle & Co., at $1.08 per day, was told off to drive mules, and for some reason the foreman had not made an order that he be paid a driver's wages. The boy refused to do the work, and was properly discharged. If there had been a grievance the proper place for the same was the Conciliation Board. Instead of that, however, all the driver boys went out on strike, stopping the mine, which employs more than 1,000 men and boys. So long as the men or boys are out on strike the Conciliation Board cannot take any cognizance of the matter.

Concrete foundations for breakers are becoming popular, although quite a recent innovation. One half of the foundations for the new Diamond breaker of the Lackawanna are being built of concrete, the other half of immense stone blocks, which have served as foundations for engine-houses, and were utilized in connection with the breaker for economy. This breaker is being built under the supervision of Willis Loomis.

The Pine Hill Coal Co. will also build concrete foundations for the new breaker

at Minersville, which is to take the place of the breaker destroyed by fire about two months ago. It will have a capacity of 600 tons per day. The president of the company is E. B. Sturges, of Scranton, who formerly had large coal holdings, which were purchased by the Ontario & Western.

The Thuron, Ronaldson, Navigation and Chamberlain tracts in Schuylkill county, which have been held for some years by Scranton capitalists, have been purchased by the Schuylkill Coal & Iron Co., which will develop the property. The tracts comprise about 600 acres, upon which a number of shafts will be sunk. Congressman T. H. Dale conducted the negotiations on behalf of the vendors.

Since the Scranton Coal Co. acquired possession of the various properties formerly held by individual operators there has been a remarkable change in the production. When the Pine Brook colliery, in Scranton, was first operated by the company the average number of cars hoisted was 350 per day. Last Friday the record of 800 in eight hours was reached. The company is now opening out veins which were discarded by the former proprietors as unprofitable. The electric haulage system was installed in this mine when the new breaker was built recently.

A few days ago President T. D. Nicholls, of District No. 1, United Mine Workers, revoked the order lowering the initiation fee from $10 to $3, and gave strict instruction that after Oct. 1 no member must be received unless the full fee of $10 be paid. At a conference in Hazleton, held on Thursday, the presidents of the other two districts protested, and Mr. Nicholls has revoked his order, so that the reduced fee of $3 will remain in force until Nov. 1. It was reduced by John Mitchell from $10, upon the occasion of his visit, in order to induce some of the backsliders to return to the fold.

In order to make the mine cages as safe as possible, the Lehigh Valley Coal Co. is installing a new duplex dog on all the carriages. A number of patents are now on the market, inventors having been stirred by the demand for a "safe safety dog" following the recent tests ordered by the chief of the Bureau of Mines.

Victoria, B. C. Oct. 2.

Kootenay.—Two fires at district mines have resulted in loss and the temporary throwing of miners out of employment. One took place at the Hewitt mine, in the Slocan, where the sorting-house and aërial tramway upper terminal were destroyed. The loss was $1,000 in buildings and $6,000 in high-grade ore which was scattered down the mountain-side. The other was at the St. Eugene mine, East Kootenay, where the upper terminal of the aërial tramway was burned, and the transportation of ore to the concentrating mill stopped until repairs can be effected. Meanwhile about 100 men will be thrown out of employment.

Boundary. — Some interesting results have been obtained from prospecting with the diamond drill below the 300-ft. level of the British Columbia Copper Co.'s Mother Lode mine. A hole, started in the 300-ft. level, and drilled at an angle of 75° toward the east, entered the hanging wall rock at a depth of about 100 ft. The details of assays of the core at various depths were as under:

Depth of Hole.	Gold, Oz.	Silver, Oz.	Copper %.
0 to 10 ft.	0.42	0.44	4.00
10 " 20 "	0.36	0.60	4.40
20 " 30 "	0.42	0.84	3.70
30 " 40 "	0.02	Trace	0.60
40 " 50 "	0.06	0.18	2 80
50 " 70 "	0.05	0.17	1.60
70 " 85 "	0.40	0.26	4.10
85 " 100 "	0.40	0.22	2.70
Average.....	0.258	0.317	2.89

Gross assay value with copper at 16c. and silver at 60c., is $14.60 per ton.

While at best, cores from diamond drill-holes are but indications of the general character of the ore penetrated, and so may not safely be taken as a reliable basis for estimating average values of the whole body, it is gratifying to find ore of such good grade in the deeper parts of this mine.

When, three or four years ago, the mining of ore in the 200- and 300-ft. levels of the Mother Lode mine was discontinued, in favor of quarrying the ore in large open cuts at the surface, thus avoiding the cost of hoisting from underground, there were big reserves of ore left in those levels, which had been opened for considerable lengths. The orebody, as opened at the 200-ft. level, has a width varying from 80 to 100 ft., and the workings show it to be continuous at this level for at least 350 ft. At the 300-ft. level less exploration was done, but the main orebody was proved to maintain its large size, while a second shoot of ore, 18 to 20 ft. wide, was encountered and followed for 200 ft. without its dipping out of the level. The methods of mining that have been followed here were described and illustrated in this JOURNAL in April and May, 1902.

Mexico. Oct. 10.

In the JOURNAL of Sept. 30, your Denver correspondent wrote that an investigation made by the Mexican government showed that the American Smelting & Refining Co. in the smelters it controls has only a capacity of 4,000 tons, as against a capacity of 14,500 tons for the independent plants. But he neglects to add, or is not aware of the fact, that almost all of the independent plants are smelting wholly their own ores (from their own mines), and so do not come into competition with the Trust, or, as is the case with most of the 36 which have a capacity of only 25 to 250 tons per day, they are in out of the way places, from which the shipping of the raw ore to the Trust plant could not be made to pay because of the long haul, and yet which are more or less under the control of the American Smelting & Refining Co. just the same, as their products are largely sold to it. And until just recently those independent plants, as the Torreon and San Luis Potosi, that might be looked upon as competitors, worked together in a pool, so as not to cut prices, or bid against one another, and so the monopoly was enjoyed. Just now, however, there is a little rate war on, as the time of the pool contract has expired, and it is known that one or two splendid contracts have been obtained; but there is not enough in this method of procedure, and without doubt, as soon as several of them secure contracts for some special ores they have wanted, the pool will again be formed, and the miner will have to take what he can get or quit work. The first, perhaps, to take advantage of the lapse of the pool contract was the Torreon plant, which has already picked up a number of desirable contracts. The activity of the Torreon people in this regard was no doubt due in part to the breaking off of negotiations for the sale of the plant, which occurred early in September, and to make the proposition that much more attractive to the New York people who were negotiating for the plant. It is believed that nothing will come of these other negotiations, and that the American Smelting & Refining Co. is again trying to deal.

In Sonora work is being pushed on the shaft of the South Cananea Copper Mining Co., by Robert Mitchell, former manager of the Greene Consolidated. The shaft is now down 100 ft., and the engineers calculated that the great Massey orebody, struck in the Green Consolidated workings, should be struck at 125 ft., but the shaft will be continued down to at least 200 ft. for the better handling of the ore. The smelter for this company will be placed on the border at Naco, and the machinery and furnaces have already been ordered for a 250-ton plant, which, it is expected, will be finished early in 1906. It is the intention to complete the electric and ice plants this year. The Sonora Mining & Development Co. is said to be opening up a good body of copper ore, well up in silver and gold, near Hermosillo; and also close by is operating a graphite mine, from which the products, after being mined, sorted and screened to about ¼-in. net $30 a ton. There have been shipped some 400 tons, with several hundred tons still ready for shipment.

In the Topalpa district, the Chatterton Mining Co. has paid $50,000, Mexican, for the San Antonio y Anexas, and agreed to spend $100,000 in development work under the management of N. W. Kinross; and the same company is prospecting an immense placer tract near San Gabriel, which it is said shows as high as $2.50 gold to the yard. Charles Kratz, S. S. Gates and C. E. Carroll have an experimental cyanide plant at Ahualulco

for the treatment of a large body of $20-ore in Los Pozos mine. The Bonanza Mining Co., with Judge Thomas Savage, of Sudbury, Pa., as president, and E. J. Callahan, of Guadalajara, as manager, is preparing to spend $100,000 gold on the Barranca mine, of Ameca, and will have in a 30-ton cyanide plant.

London. Oct. 7.

The London mining market is now largely occupied by American propositions; these and Broken Hill ventures practically dominating the market. I have already referred to the boom in Esperanzas and the introduction of the Oroville Dredging Co. The great find at Esperanza has had a reflex effect in drawing attention to El Oro, the mine under the wing of the Exploration Co., and the time has naturally been considered opportune to bring on the market the shares of the new company recently formed, the Mexican Mines of El Oro, Ltd., to take over from the Exploration Co. some additional claims in the district; in fact, immediately joining the Esperanza. There is no doubt that these new shares will be rapidly absorbed during the next few months. Before long we may expect to see the Viloro shares on the market. This company was formed to acquire placer ground in Oroville, which was recommended by T. H. Leggett. Mr. Leggett has also recently obtained options on a Guanajuato property, which will be brought to London. It will thus be seen that England is once more becoming largely interested in American mining.

Stratton's Independence continues to interest London shareholders. The report for the year ended June 30 last is not yet published, but I am informed that the profit at the mine has been £98,000 during the year. Also, the outlook for the current year is just as good as ever. Your readers will be aware that at this mine all the lower levels below 900 ft. have been abandoned, and that the mine has been let to tributers. Most of the good-grade ore, that is, over $15 a ton, comes from stringers and branches leading off from the main vein systems. The mine is a perfect network of such veins, and there can be no doubt that small but rich shoots of ore will be found as development proceeds. The mine also contains quantities of ore lower than $15, which at the present time does not pay for extraction in Cripple Creek. It is only natural that the directors should be experimenting on these low-grade ores and on the ore on the waste dumps. It may not be in the immediate future, but at some time or other, these reserves will be an asset of value to the company. At the present time the company is experimenting on the Cassel process, and, according to Mr. Godfrey Doveton, who has been supervising the trials, the process is of some promise. What its actual value is remains to be seen. In reviewing the history of Stratton's Independence, one cannot help thinking of the proverb that threatened men live long.

General Mining News.

Oil Exports.—Exports of mineral oils from the United States for the nine months ending Sept. 30 are reported as below, in gallons:

	1904.	1905.
Crude	72,007,962	75,761,830
Naphthas	14,568,565	22,696,139
Illuminating oils	562,026,685	655,107,098
Lubricating oil	61,186,448	76,334,399
Residuum	22,553,883	48,109,704
Total	732,343,543	878,009,170

Paraffin is included in lubricating oils. The total increase this year was 146,265,627 gal., or 19.9%. The values reported were $58,722,477 in 1904, and $57,293,634 in 1905; a decrease of $1,428,843, showing a lower range of prices this year.

Lake Superior Ore Shipments.—The shipments of iron ore from the Lake Superior district in September were 4,425,550 tons, an increase of 419,108 tons over the large movement of September, 1904, when shipments were rushed to make up for the deficiencies of the early part of the season. From the opening of navigation to Oct. 1 the ore shipments by water from the upper Lake ports were as follows:

Port	1904.	1905.	Changes.
Escanaba	2,292,646	3,925,355	I. 1,632,709
Gladstone	480	.....	D. 480
Marquette	1,178,044	2,259,834	I. 1,081,790
Ashland	1,431,731	2,586,194	I. 1,154,463
Superior	2,683,034	3,866,778	I. 1,183,744
Duluth	3,041,006	6,787,378	I. 3,746,372
Two Harbors	2,995,497	6,048,067	I. 3,052,570
Total	13,622,438	25,473,606	I. 11,851,168

The total increase this year was 87%. The great gains at Duluth, Superior and Two Harbors show how large a proportion of the ore has come from the Mesabi this year. Gladstone has ceased to be an ore-shipping port.

Sault Ste. Marie Canal Traffic.—The freight passing through the Sault Ste. Marie canals in September was 5,782,944 net tons. The total tonnage reported from the opening of navigation up to Oct. 1 was: West-bound, 5,502,228; East-bound, 26,445,515; total, 31,947,743 tons; an increase of 11,858,111 tons, or 59% over 1904. This year's traffic has been the heaviest ever known. The items of mineral freight included in the totals were as follows, in net tons, except salt, which is given in barrels:

	1904.	1905.	Changes.
Anthracite	638,459	662,804	I. 24,345
Bituminous	3,208,389	4,196,459	I. 988,070
Total	3,846,648	4,859,263	I. 1,012,415
Iron Ore	12,394,797	23,788,994	I. 11,394,197
Pig and Man. Iron	139,856	142,201	I. 2,345
Copper	65,533	75,378	I. 9,845
Silver Ore	1,313	.....	D. 1,313
Building Stone	19,116	7,963	D. 11,153
Salt, bbl	281,959	317,780	I. 35,821

The total number of vessels reported passing through this year was 15,844; showing an average cargo of 2,016 tons.

Coal Meeting.—A meeting of the operators of District 21, of the Southwestern Interstate Coal Operators, was held at South McAlister, Ind. Ter., Oct. 2, in order to begin preparations for the next convention with the miners. District 21 comprises Arkansas, Indian Territory, and Texas. To facilitate the work the district was divided into eight sub-districts, in which meetings of the operators, superintendents, and mine foremen will be held; and on the second Monday in November a meeting of the local scale committee will be held in South McAlister to receive reports from the different sub-districts.

ARIZONA.

COCHISE COUNTY.

Cochise Consolidated Copper Co.—This company, with home offices at 1404 Arrott building, Pittsburg, Pennsylvania, has named the town site Pittsburg, and has filed a petition for a post office. The property of this company is located about 6 miles northeast of Paradise, in Cochise. The company has been at work on the property for about two years, and has developed bodies of mixed sulphide ore. The directors of the company are going to visit the mines in December, at which time the company will have installed a 100-ton concentrating plant, and the contemplated visit is to see the mill started in full operation.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—This company informs us that the output of its mines at Clifton for the month of September was equivalent to 986 tons of copper. The continuance of adverse weather conditions and breakage of part of blowing engine stopped production for the equivalent of fully a week.

John Gill has been elected chairman of the board of directors in place of Sir William Menzies who, owing to ill health, has retired from the chairmanship.

CALIFORNIA.

AMADOR COUNTY.

Climax.—In about one month the new 10-stamp mill will be in running order. Two miles of ditch and 4,000 ft. of pipe are being put in to bring water to the mine.

Central Eureka Mining Co.—This company, at Sutter creek, is now paying 5c. dividends monthly. W. R. Thomas, the superintendent, has withdrawn his resignation and will continue in service.

Argonaut Mining Co.—This company, at Jackson, is paying monthly dividends of 10c. The orebody south of the shaft has opened out largely. The power at the mine is being changed from water to electricity.

CALAVERAS COUNTY.

Lightner Mining Co.—At this extensive property, at Angels, Alex. Chalmers, superintendent, a 30-ft. vein has been struck at the 700 level, which shows that the main orebody worked on the upper levels has been reached in the lower levels.

Utica Mining Co.—Taking advantage of the low water stage, this company at An-

gels is making the annual repairs to the reservoir and ditch system.

EL DORADO COUNTY.

Baker.—A shipment of 25 tons of copper ore, the first from the mine, has been made to the Selby Smelting Co.'s works. The mine is at Ringgold.

North Weber.—This gravel mine, above Camino, is being equipped with new machinery. Prospecting shows a good body of gravel in sight.

KERN COUNTY.

Amalie District.—In this district the Cowboy has a good force of men at work. The Amalie mill is running full capacity. It is expected that the Zenda will soon start up again; and that a custom mill will be erected by the Zada Mining Company.

LOS ANGELES COUNTY.

Red Rover.—It is reported that, after careful examination and survey, Ex-Governor Henry T. Gage and associates will again operate this old mine at Acton. At one time it was a good producer, but has been practically idle some years.

PLACER COUNTY.

Reed and White.—F. G. Albinos and Mah Toy, of Michigan Bluff, have leased from J. D. Meredith the Reed and White placer mines, and the Reed ditch and water rights, with the privilege of purchase at a stated price.

PLUMAS COUNTY.

Dutrie.—From this gravel claim at Squirrel creek, near Quincy, some very fine nuggets are being taken by J. P. Dutrie and Byron Turner.

SACRAMENTO COUNTY.

Blue Ravine.—Pay gravel has been struck in the new shaft of this property above Folsom, which means renewed activity in that district.

SAN BENITO COUNTY.

Florence Mack Quicksilver Mining Co.—This new company has been organized at Hanford, to work a quicksilver mine about seven miles south of the famous New Idria mine. A road has been built to connect with the Coalinga road. The directors are Wm. Thompson, G. E., W. S. and J. O. Barton and N. Wolfsgale.

SHASTA COUNTY.

Great Western Gold Co.—Sixty men are now at work in the mine and the Afterthought smelter is running steadily. The large freight teams are hauling in coke for winter supply, and return loaded with matte.

Original Quartz Mill Mining Co.—This company has a contract for supplying silicious ore for fiuxing purposes to the Mammoth smelter and has commenced shipping.

Mammoth Copper Co.—The smelter of this company at Kennett is expected to be in operation within two weeks. Meantime the company is engaging quantities of silicious ores which carry values, which will be stored ready for use.

Clear Creek.—The upper reaches of this creek, between Delta and Trinity Center, are being worked by miners, who have recently found numerous large nuggets. A quartz vein has also been uncovered.

Arps Group.—This group, in Bully Hill district, has been bonded to J. T. Donellan, and a force of men has been put to work. The old works are being cleaned out.

SISKIYOU COUNTY.

Eliza.—At this mine, on Humbug creek, the boiler and engine for the 10-stamp mill are in place; and a boarding and bunk house are in course of construction.

Ball and King Solomon.—It is reported that these mines at Rollin will resume work again under management of Wayland H. Young.

Johnson.—Work has been resumed at this mine, Oro Fino. Superintendent Addison expects to strike the ledge in the new tunnel within the next 50 ft. The mine is owned by the Medina Mining Company.

SONOMA COUNTY.

Socrates Quicksilver Mining Co.—At this property, Pine Flat, all the machinery will shortly be operated by electricity. The company has built a new 50-ton furnace, which will be ready to handle ore by November.

TRINITY COUNTY.

Gold Standard.—In this mine, at Coffee creek, they have found a new and rich ore-shoot on the strike of the ledge.

Deadwood.—This placer mine has been sold to San Francisco Chinese, who will soon put on a large force.

Bonanza King.—This property, near Trinity Center, is being opened up by the Treadwells, with Joseph Porter as superintendent. There is a small mill on the claim.

TUOLUMNE COUNTY.

Big Creek.—In this mine, near Groveland, a crosscut has uncovered a 3-ft. vein which carries good values.

Sunnyside.—W. P. Cunningham has bonded this mine and will add a compressor to the machinery on the property. A new tunnel will be started to tap the vein 200 ft. deeper.

Santa Ysabel Mining Co.—As soon as water power is again available, 20 of the 40 stamps of the mill will be started. New concentrators have been purchased.

Confidence.—On this mine, at Confidence, the incline shaft is now down 900 ft. and drifting is going on at the bottom to find the pay-shoot worked on the upper levels. There are 50 men on the payroll, and the mill and cyanide plant are in constant operation.

App Mine.—At this mine, which has heretofore depended on water for power, engines and boilers are being installed so that work may continue during the usual fall "water famine" in the county.

Star.—A $6,000 contract has been let for certain sinking and timbering in this mine.

Vine Spring.—The 5-stamp mill, concentrators, cyanide plant, etc., are being removed from this mine to be used elsewhere.

Experimental Gulch.—A good body of ore has been encountered in this mine near Columbia. The rock will mill about $15 per ton. A new pump is being put in.

COLORADO.

GILPIN COUNTY.

Gold Rock.—J. J. Elliott, of Russell gulch, has taken hold of this property under lease and bond from Denver owners; he is erecting new shaft-building, 24 by 50 ft., and is overhauling plant of machinery, intending deepening of 600-ft. shaft.

Copper Six Mines Co.—Incorporated with capital stock of $100,000 to operate in northern Gilpin, with J. M. Blakeslee Tolland, as manager, incorporators being W. H. Lewis, M. H. French and C. L. Peck. Company has obtained lease and bond on the Sampson group in Leslie gulch.

Tawawasa Gold Mining & Cyaniding Co.—New York people recently purchased the Aduddell group for $100,000 and made a substantial payment, and besides driving a lateral from the Newhouse tunnel to get under Aduddell shaft, are overhauling machinery at main shaft in Willis gulch. They are preparing to sink this 400-ft. shaft to the tunnel level, a total depth of 1,700 ft. The vein in the tunnel is 65 ft. wide, and a heavy shipment will follow. R. E. L. Townsend, Idaho Springs, is manager.

Smuggler.—C. Horning, of Nevadaville, Col., representing Easterners, has taken a lease and bond in the sum of $15,000 on this property in Moon gulch, near Rollinsville, and will erect a slow-drop 10-stamp mill, with amalgamation and concentration methods.

Pewabic Consolidated Mines Co.—Manager J. C. Fleschhutz, Central City, has contracted for the installation of a 12 by 16 hoisting engine on the Iron shaft in Russell district, and large boiler and air-compressor are to be also installed.

Evergreen Gold & Copper Mines Co.—New machinery, consisting of a 45-h.p. gear hoister and 85-h.p. boiler has arrived and is being installed on the Evergreen shaft, and a new building 30 by 60 ft. is in course of erection. Company intends sinking the shaft several hundred feet deeper. J. L. Walters, Apex, Col., is superintendent.

Fairfield Gold Mining Co.—Baltimore, Md., people are interested; a new shaft building has been completed and a 9 by 10-in. Vulcan hoisting engine and 80-h.p.

boiler are being installed. W. M. Nickerson, Opera House Building, Denver, is manager.

BOULDER COUNTY.

Good Morning Tunnel.—Manager Fred G. Shaeffer has interested Nashville, Tenn., capitalists in the driving of this tunnel a distance of 7,000 ft., to cut the Livingstone and other well-known veins; the cost is estimated at $250,000. New machinery is to be installed for speedy developments, the tunnel running from Wall Street camp. Dr. Kingsley and Denver associates have taken options on over $250,000 worth of property along line of tunnel.

SUMMIT COUNTY.

Gold Pan Placer Mining Co.—It is reported that the affairs of this company are being adjusted so that operations will be again resumed on a large scale next season, at property near Breckenridge.

Senator Mining Co.—Stockholders have voted bonds to amount of $30,000, for the purpose of driving the main tunnel for opening up a large group of mines. Manager M. M. Howe, of Breckenridge, has been retained. A compressor plant has been recently installed at mouth of property.

Buckeye Gold Mining Co.—St. Paul and Minneapolis people have become interested in the Carbonate and Little Tommie groups on Mount Baldy, and George E. Moon, Breckenridge, has been appointed manager.

Mary Verna and North America.—It is reported that the J. George Leyner Engineering Co., of Denver, has secured a contract for a $10,000 compressor and power plant to be erected in Ten Mile cañon, near Frisco.

Briar Rose Group.—Memphis, Tenn., people have purchased this group from C. A. Finding and other owners, of Breckenridge, the consideration being reported at $25,000. The new owners are going to open up the mine with a lower tunnel.

CLEAR CREEK COUNTY.

Refugee.—This group, in Hukill gulch, is reported sold to Starbird & Lewis, of Denver, consideration being $35,000. The property was purchased last December for $25,000, since which time it had produced close to $20,000, and had been equipped with machinery.

Gem Mines Co.—The installation of an electric air-compressor has been completed at the Gem main shaft. It will be driven by a 150-h.p. electric motor, and will furnish air for 10 Leyner drills. About 25 sets of lessees are working in this property. W. E. Renshaw, Idaho Springs, is manager.

IDAHO.

IDAHO COUNTY.

The Elk City district, an old placer-mining camp, is now showing some progress as a quartz-mining district. The Buffalo Hill group, owned by Leggat & Steward, is developed to the producing point. The Buster, owned by S. W. Smith, of Butte, has recently opened up a considerable body of ore, running well in gold. It is free milling ore. The Hogan, 12 miles from Elk City, has a large body of low-grade ore, and the owners have put in a cyanide plant of 100 tons capacity.

INDIAN TERRITORY.

CHOCTAW NATION.

Coalgate Coal Mining Co.—This company, whose mines at Coalgate have been idle all summer, is now beginning operations again. While shut down the company installed the most modern electrical equipment of all kinds. All the coal will be mined with Sullivan electric long-wall chain machines, with self-propelling trucks. Mules will be dispensed with entirely, and all coal will be hauled by electric locomotives. The mines are very dry, and the rooms will be driven both up and down the pitch, which is about 14°. The empty cars will be pulled into the up-pitch rooms by a cable passing around a pulley or snubbing post near the face of the room, and the loaded cars dropped by gravity to the entry, pulling the rope back in position to take in the next empty car. The loaded cars will be pulled out of the dip rooms by a cable and drum attachment on top of the gathering motors, which will then take them to the slope.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

At the annual meetings of the stockholders of the Mineral Range, Hancock & Calumet and Marquette, Houghton & Ontonagon railway companies, held in Marquette, Norman W. Haire was elected to the various offices previously held by W. E. Parnell, whom he succeeded as head of the Michigan interests of the Bigelow syndicate. Mr. Haire was elected vice-president of the Mineral Range, and, together with J. T. Reeder and William Veale, represents the Bigelow interests on the board of directors. Mr. Haire and Mr. Reeder were also elected directors of the Hancock & Calumet and the Marquette, Houghton & Ontonagon companies.

Calumet & Hecla.—Work on a sub-station, which will form an important link in the Calumet & Hecla's scheme for the substitution of electric power wherever practicable throughout the mine, has started. The sub-station will be near the old electric power plant at the mine, and will be used to distribute power received from the large new power-house near the stamp mills at Lake Linden. Wires to transmit this power are being strung.

Centennial.—President H. F. Fay, of Boston, has completed an examination of this mine and returned East. In September the mill at Grosse Pointe was in commission on Centennial rock 13 days, stamping 7,840 tons. The mineral yield was 116 tons, an average of 1.48%, or practically 30 lb. to the ton. No. 1 shaft is down to the 29th level, 3,000 ft. deep, and bottomed in good copper rock. The 24th, 25th, 27th and 26th levels south are in good copper values, and the management believes the workings at those points have entered the rich copper shoot dipping south from the Wolverine into the Centennial property. A plat will be cut at the 28th level, which was passed, and a drift driven to open the rich ground southward.

Isle Royale.—North of No. 1 shaft, and close to the limits of the village of Houghton, a diamond drill has been rigged up to locate and explore the Grand Portage lode. A drift is exploring this lode at a depth of 80 ft. between the drill and the shaft. Work at that point will be continued all winter, and by spring it is expected that sufficient knowledge of the formation will be acquired to enable the management to shape its policy for the future. At the shaft on section II, a new compressor has gone into commission. It is capable of operating 8 drills, and will meet the requirements in sinking the shaft to a depth of 500 ft. and carrying on development to that point. Rock shipments from this shaft are forwarded to the mill regularly. Sinking will reach the 2d level in a few days. It is bottomed in copper ground at present.

Quincy.—Henry C. Fish, clerk of this mine for the last four years, has resigned and is succeeded by F. J. McLain, of Atlanta, Ga., formerly with the American Cotton Company.

KEWEENAW COUNTY—COPPER.

Ahmeek.—Connection between the two shafts on this property has been established by a drift on the first level. The shafts are 1,445 ft. apart and the connection was made at a depth of 225 ft. Excellent copper ground was exposed for the entire distance, the average quality being fully equal to that exposed in the shafts. No. 1 shaft is now 740 ft. deep and No. 2 is down 765 ft., both being bottomed at the fifth level. The character of the ground penetrated by both shafts is good, the lode being uniformly well charged with copper.

ONTONAGON COUNTY—COPPER.

Hamilton.—Operations on this property, in Matchwood Township, are confined to drifting on the Norwich vein from the point where it was intersected in the tunnel driven into the base of the bluff. The west drift is 200 ft. long and the east drift 150 ft. The lode is 6 to 8 ft. wide and shows some copper in the easterly openings. It was encountered 502 ft. from the mouth of the tunnel, and 400 ft. below surface. It is planned to tap the Meads vein in the tunnel later. A small stamp mill will be erected on the river next spring by the Copper Crown Mining Co., which owns the mine.

Mass Consolidated.—As soon as the equipment at the new C shaft is completed and the railroad spur to that point ready, there will be a greater increase in production. Fully one-third of the product is secured in the form of mass and barrel copper. There are 36 drills in use and the working force has been increased considerably.

Norwich.—This mine was purchased by the Copper Crown Mining Co., and will be explored next spring.

KEWEENAW COUNTY—COPPER.

Delaware.—An investigation of the mineral values of this property, recently acquired by the Calumet & Hecla Mining Co., has been started. A couple of old pits have been cleaned out. The lode in which they are sunk will be opened and identified. Some excellent copper rock has been taken out, and it is possible that developments on a large scale will be started. The property is traversed by three known lodes which give evidence of copper values.

Keweenaw Central Railway.—At Lac La Belle the dredging of the canal connecting that body of water with Bete Gris, Lake Superior, has been completed to a depth sufficient to admit vessels drawing 14 ft. of water, and has been suspended until the company's other operations shall have advanced sufficiently to justify a deeper channel. Men are completing that portion of the railway between the Cliff mine and Lac La Belle.

Keweenaw Copper Co.—One diamond drill is in service on the Mandan property. There are some excellent outcroppings on the tract, but it is not known what the result of the drill investigation is.

NEVADA.

ESMERALDA COUNTY.

Red Top.—One of the most important developments in Goldfield in the last six months has occurred in the Red Top mine, adjoining the Jumbo on the north. The property has been remarkable for a large body of low-grade ore on the surface, which has been under development for some months past, the ore showing improved values at depth. Recently, in a crosscut from the drift on the 100-ft. level, a shoot of high-grade ore was opened up. The total width of the shoot is 8 ft. 2 in. and repeated sampling and check sampling give high values.

Florence.—The first trainload of ore to leave Goldfield over the new railroad via Tonopah to Salt Lake valley consisted of 600 tons of the value of $200 per ton. The ore was from the Reilly lease on the property of the Florence Mining Co. At the 350-ft. station in the Jumbo mine the management has exposed 4 ft. of ore that gives very high assay values.

Kendall.—A strike has been made on the Kendall, which is owned by a company of the same name, situated north of the Sandstorm. Oddie & Gardner took a fortune out of a lease on the ground last year and some of the ore was very rich. In getting out the high-grade a large tonnage of mill rock was broken. They erected a 10-stamp mill for its treatment near Rabbit springs, and for the past four months it has been kept busy night and day on ore from their dump. After the lease expired the company took charge, but until this week found very little ore of good grade. In a surface trench a new ore chute was found. The orebody has been opened up in four places and appears to be 4 ft. wide. Quartz that assays from $70 to $700 is now being sacked.

NEW JERSEY.

WARREN COUNTY.

The large limestone deposit on the Cox farm, near Pinkneyville, has been leased by parties from Dover, N. J., who have begun to open a quarry on a large scale. A spur is being built to connect the quarry with the Lehigh & Hudson River road.

OREGON.

BAKER COUNTY.

Cyclone.—Ernest Dale Owen, of Chicago, has made arrangements for re-starting operations on the Climax mine, situated about 7 miles east of Baker City, and adjoining the Emma and Virtue mines. The mine was closed down for some time on account of financial difficulties. A new lead is reported to have been discovered on the property.

Climax.—An important strike has been made in the Climax mine, at Bourne camp, 8 miles from Sumpter. The property is owned by Geo. W. Grayson, of San Francisco, and has been under development for a number of years. It adjoins the Columbia, and is near the North Pole mine. The orebody was discovered in the upper level; the vein is 4 ft. wide and assays as high as $150 per ton. By means of a small hand mill the manager has taken out several hundred dollars of free gold.

Cleveland.—The Cleveland group of copper claims on Goose creek, about 30 miles east of Baker City, which has been under development for several years, is making a good showing, and Manager J. T. Miller is now laying in supplies for the winter. He says he will run a full force of men and expects to have his property in shape for machinery in another year. He is continuing deep sinking. The orebodies maintain good values in copper and gold. Other properties in the camp, notably those of Foster & Thomas, Van Love, Cox and Gwinn, have been well developed and show copper ore of high grade.

PENNSYLVANIA.

ANTHRACITE COAL.

Coxe Brothers & Co.—The following official notice was issued Oct. 13: "The board of directors of the Lehigh Valley Railroad Co., at a special meeting held this day at the office of the company in Philadelphia, authorized and confirmed the purchase of the entire capital stocks of Coxe Brothers & Co., Incorporated; the Delaware, Susquehanna & Schuylkill Railroad Co. and the allied water companies, the Drifton Water Co., Beaver Meadow Water Co., Tomhicken Water Co., and Oneida Water Co. The purchase of these stocks carries with it the ownership of all the collieries and mine properties of Coxe Brothers & Co., including over 1,100 miners' houses, all the real estate of that company in Chicago and Milwaukee, and the floating equipment in New York harbor, as well as the railroad of the Delaware, Susquehanna & Schuylkill Co., with a total mileage of 76.51 miles, together with the shops and equipment of 23 locomotives, approximately 2,100 coal cars, passenger coaches and work cars.

"The companies were purchased as a going concern, including coal mined and on hand, together with all railroad and mine supplies. All of these properties are free and clear of any mortgage or encumbrance whatever. The consideration to be paid for the properties in question is to be provided for by an issue of collateral trust bonds to be secured by pledge of the stocks of Coxe Brothers & Co., and the Delaware, Susquehanna & Schuylkill Railroad Co. A portion of these bonds will be retired annually, commencing with 1907.

"The Lehigh Valley interests will enter into possession of the properties Nov. 1, 1905. Coxe Brothers & Co., Inc., are the largest individual operators in the anthracite field, their annual capacity exceeding 2,000,000 tons, which will hereafter add that much to the Lehigh Valley's output, as well as insuring to it the haul on this increased tonnage. As a result of the consolidation of the management of the newly acquired properties with that of the Lehigh Valley, many economies will be effected, thereby reducing the expense of operating the properties."

Some comment on this transfer will be found on another page.

Foreign Mining News.

MEXICO.

SONORA.

Greene Consolidated Copper Co.—At the annual meeting in New York last week, the following directors were elected: Eugene N. Foss, H. C. Hulbert, Thos. P. Wilson, Gov. W. A. Woodberry, L. D. Baldwin and A. Bleecker Banks. The old directors whose names are not included on the new board are James

Phillips, Jr., W. V. S. Thorne and Edward B. Tustin.

The stockholders voted down the suggestion to change the dividend policy of the company in order that dividends might be declared quarterly instead of bi-monthly, and the regular bi-monthly dividend of 4%, payable Oct. 30, was declared.

Greene Gold-Silver Co.—At the annual meeting in New York, Oct. 14, the following directors were chosen: W. C. Greene, M. L. Sperry, Myron M. Parker, Alfred Romer, John A. McShane, John T. Morrow, Charles W. Mackey, Jacob Weidman, A. B. Fall, James W. Rowland, Franz Meyer, Theo. Sternfeld, James H. Kirk, Galen L. Stone, R. W. Pillsbury, Bird S. Coler, Geo. J. Kobusch, L. D. Baldwin, U. A. Woodbury, L. H. Hole, Edward Brinley, Orrin D. Bleakley, Edward C. Rice and J. B. Showalter. It was voted to authorize the sale of 100,000 additional shares at par, $10 per share.

Coal Trade Review.

NEW YORK, Oct. 18.

ANTHRACITE.

The hard-coal market shows a slight relapse locally, with the continuance of warm weather. Shoal-water harbors in the East, however, are striving to lay in large supplies before ice sets in. The small sizes are in active demand, even washery coal moving off with rapidity.

The reported sale of Coxe Brothers & Co. to the Lehigh Valley is now confirmed. The change of management takes place on Nov. 1.

Prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

The soft-coal trade along the Atlantic seaboard is very strong; the whole question seems to be a matter of getting cars and of moving coal to its destination. The demand is largely in excess of the supply, and current prices are advancing regularly. About $2.80, f. o. b. New York harbor shipping points, seems to be the current price paid for soft coal of the ordinary grades, and the trade is looking for a still further advance, with a continuation of the demand for several months to come. Complaint of car shortage is general, and the main line roads, on which practically all the coal originates, are embargoing those connecting lines which fail to return cars promptly. Orders for new cars have been placed, but these will not affect present conditions. There is a scarcity of light-draft vessels on account of their having been dispersed to other lines of trade by the inducements of higher rates.

Trade in the Far East is bringing shippers a large quantity of orders, and all ports in that territory are pushing for coal. The Sound is taking all the coal it can get, and is calling for more. In New York harbor, contract business is active, and current trade is obliged to bid up the prices on spot coal in order to get supplies. All-rail trade is calling for coal, but producers are cutting it down in favor of tide business. Car supply is bad in all territories; some producers state that they do not get one-half of their requirements. Transportation is good.

In the coastwise-vessel market, large boats are in good supply, but small ones are scarce. Current rates from Philadelphia on the larger vessels are as follows: To Boston, Salem and Portland, 80c.; to the Sound, 70@75c.; to Lynn, Newburyport, Gardner and Bangor, $1; to Saco, $1.05@$1.10 and towages; to Portsmouth and Bath, 85 cents.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Oct. 7, in short tons:

	1904.	1905.	Changes.
Anthracite	3,40*,332	3,482,568	I. 74,236
Bituminous	20,550,935	22,340,050	I. 1,789,115
Coke	6,489,128	8,385,906	I. 1,896,778
Total	30,448,395	34,208,524	I. 760,129

More than half the increase this year has been in coke.

The Chesapeake & Ohio Railway Co. reports coal tonnage over the road for the two months from July 1 to Aug. 31 as follows, in short tons:

	1904.	1905.	Changes.
New River	932,762	864,445	D. 68,317
Kanawha	312,859	390,183	I. 77,324
Kentucky	13,374	14,181	D. 807
Connecting lines	21,757	66,386	I. 44,629
Total carried	1,280,752	1,335,195	I. 54,443

Of the coal originating on this line this year, 522,722 tons were carried west; 181,267 tons were delivered to points east of the mines, and 565,170 tons were carried to tidewater.

Coke tonnage for the two months was as follows, in short tons:

	1904.	1905.	Changes.
New River	27,884	46,297	I. 18,413
Kanawha	4,234	17,517	I. 13,283
Connecting lines	473	42	D. 431
Total	32,591	63,856	I. 31,265

Of the 63,814 tons originating on the line this year, 35,302 tons were carried west, and 28,512 tons east.

Chicago. Oct. 16.

All kinds of bituminous coal are firm, the market showing no disposition to sag under the mild weather of the last week. With each cold wave, however, there is a notable increase in demand, showing that supplies of bituminous, as of anthracite, are running close to the needs of customers, and that the coming of severe winter weather will make heavy demands on dealers. There is complaint everywhere of the lack of cars for coal shipments, and no encouraging prospects in this respect are held out by the railroads. Serious trouble is apprehended by dealers as soon as the winter begins.

Shipments from Illinois and Indiana mines are still small, on account of the lack of cars, and this keeps up prices, added to a somewhat capricious increase in general consumption. Western bituminous—Indiana and Illinois—sells at $2.25@$2.50 for domestic lump; run-of-mine, $1.60@$2, and screenings, $1@$1.50.

Of Eastern coals, smokeless is apparently greatly hampered by the car situation, and Hocking is said to be shipping less than half the normal product of the mines. Smokeless is quoted at $3.30 for run-of-mine and $4.30 for lump and egg, with demand good but supplies limited. Hocking is in strong demand, and the prices are close to the list quotation—$3.15. There is some cutting on all grades of Eastern coals, winter and summer, and this condition influences the business greatly at a time when supplies are limited.

Anthracite is still a poor seller, with no prospects that it will become better until cold weather sets in for good.

Cleveland. Oct. 17.

The coal trade in this territory is largely dependent upon the car supply. Steam coal is in good demand. The price has been marked up to $1 at mines for run-of-mine, Ohio or Pennsylvania. The price of slack is firm at 60c. for Pennsylvania and 70c. for Ohio. The lake movement is slow, but the price is stronger, Lake three-quarters being held for $2, f. o. b. boats at Lake Erie ports.

The coke market is especially strong, being influenced by the car shortage. The best grades of 72-hour coke have been marked up during the past week to $3.50 at the oven, while the best grades of furnace coke are selling for $3.

Domestic coal is strong. Price is firm at $2.10 at mines for selected Massillon lump; other grades according to quality.

Birmingham. Oct. 16.

Every ton of coal being mined in Alabama is finding a ready sale. The union miners are still working at 55c. per ton for coal mining, 2.5c. below the maximum. This price is based on the average selling price of pig iron and indicates that No. 2 foundry last month did not sell as high as $12.55 per ton. The non-union miners are receiving about the same wage as the union men. The union miners are still on strike at the furnace companies' mines.

Coke is still in strong demand. J. M. Meighan, a coke oven contractor, announces that he is working on contracts for new ovens, to the amount of $90,000. It is estimated that other contractors are working on $60,000 worth of ovens. There

is not enough coke being manufactured in this district to meet all demands.

San Francisco. Oct. 11.

J. W. Harrison's circular of this date says: "Since our last, there has not been a coal arrival from Australia. There are 23 vessels listed to load coal at Newcastle, N. S. W., with a carrying capacity of about 50,000 tons; included in this list are three steamers, with a carrying capacity of about 15,000 tons. The arrivals of Colonial coal for the month of September, 1904, were 15,982 tons; for the month of September, the present year, only 5,280 tons. The deliveries of British Columbia last month were over 18,000 tons. The total deliveries of coal from all sources this year for September show a shrinkage of 19,000 tons, against the coal arrivals of the same period for 1904. There is a perceptible shrinkage of all grades of coal in the yards here; still, the wholesale prices remain unchanged, as early relief is expected from the British Columbia collieries as soon as future freight engagements can be arranged. There is but one vessel due from Newcastle, N. S. W., but the three steamer cargoes should be received here early next month. The strike in British Columbia, that has been in progress for the past four months, has been amicably arranged, and work will be recommenced at an early date. Duration of the agreement will be for two years, and the minimum rate of wages to the miners appears to be a very generous one. All collieries which have been affected by the strike just ended belong to the Western Fuel Co. here, which has absolute control over all British Columbia coal products coming to this market. Producers of fuel oil are endeavoring to establish a better rate for their products; it is very doubtful if they will be successful."

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Oct. 18.

Imports of fuel into Germany for the eight months ending Aug. 31 were as follows, in metric tons:

	1904	1905	Changes.
Coal	4,469,082	6,319,220	I. 1,850,138
Brown coal	4,869,084	5,100,802	I. 231,718
Coke	337,627	474,861	I. 137,234
Total	9,675,793	11,894,883	I. 2,219,090

The chief imports of coal were from Great Britain. Practically all of the brown coal, or lignite, was from Austria.

Exports of fuel for the eight months were as follows, in metric tons:

	1904	1905	Charges
Coal	11,487,691	11,314,804	D. 172 887
Brown coal	14,757	13,578	D. 1,179
Coke	1,800,284	1,754,144	D. 46,140
Total	13,302,732	13,082,526	D. 220,206

The larger exports of coal were to Austria, Holland, Belgium and Switzerland; of coke, to France and Belgium. There were 15,875 tons of coke sent to the United States this year.

The production of coal in Germany for the eight months is reported as follows, in metric tons:

	1904	1905	Changes
Coal	79 178,511	78,383,052	D. 795,459
Brown Coal	30,977,618	33,178,969	I. 2,201,351
Total mined	110,156,129	111,562,021	I. 1,405,892
Coke made	8,076,679	9.434,350	I. 1 357,671
Briquettes made	7,338,633	8,277,817	I. 939,184

The decrease in coal was 1%; the increase in brown coal was 7.1%. The briquettes are made chiefly from the brown coal, or lignite.

Iron Trade Review.

New York, Oct. 18.

The period of activity in the iron and steel trades shows no signs of passing. The demand for pig iron continues strong, and a higher range of prices to consumers has been established.

In finished material there is also a strong demand. Plates and structural material are still specially called for. Bridge orders have recently been placed liberally, and railroad equipment orders are also heavy. The mills have orders running well into next year, and late buyers find it hard to get deliveries promised.

Iron-ore shipments from the Lake Superior region have been heavy this season, and are likely to be increased largely before navigation closes. The only drawback is found in delays at the Lake Erie docks.

Pig Iron Production.—The estimated weekly capacity of the blast-furnaces in operation Oct. 1 was 445,500 tons, an increase of 33,000 tons over the report for Sept. 1. There were 274 stacks in blast. The *Iron Age* estimates the production of coke and anthracite pig in September at 1,898,873 tons; the largest monthly output since May.

Birmingham. Oct. 16.

The statement was made in Birmingham on good authority the last of the past week that there was no more accumulated pig iron on the yards here to be sold. Whatever iron might be seen near the furnaces in this district does not belong to the manufacturing companies. The Sloss-Sheffield Steel & Iron Co. was the largest holder of surplus iron when the present year began. J. C. Maben, president of the company, is authority for the statement that not only has all their surplus stock been sold out, but the probable make for the next six months almost has been sold ahead.

The following quotations are given in this district: No. 1 foundry, $13.50; No. 2 foundry, $13; No. 3 foundry, $12.50; No. 4 foundry, $12; gray forge, $11.50; No. 1 soft, $13.50; No. 2 soft, $13.

The Alabama Car Service Association reports that the number of cars handled during the month of September was 69,263, against 54,874 during the same month in 1904. The increase is 14,389 cars.

Chicago. Oct. 16.

In every important respect the market for pig iron and iron products continues to be strong, with indications all going to show that the strength will continue indefinitely. In fact, the looked-for October boom seems to be fully at hand. Large lots have been sold of both Northern and Southern, though Southern probably leads now, in the scarcity of Northern. Deliveries are for the first six months of 1906, chiefly, though there is yet spot business for the last quarter of 1905 and the first quarter of next year.

Prices are advancing. Southern No. 2 brings $13@$13.50, Birmingham, or $16.65 @$17.15, Chicago. Northern is quoted at $17.50@$18, and is in eager demand with the available supply, for the first quarter of 1906 at least, very small. The selling of the last week has been unusually heavy, because of the demand for iron by the agricultural implement interests; these have met their requirements by new contracts. Lake Superior charcoal is in good demand and sells at $18@$18.50, but is scarce.

All kinds of finished products are in good demand, though the extraordinary sales of three or four weeks ago are not repeated. Railroad business continues in very good demand. Billets are strong; structural steel is handicapped by large orders that forbid new work immediately and are generally delayed. Prices are advancing.

Coke is still scarce, on account of short supplies, and holds up firmly to $5.65, Chicago, for 72-hour Connellsville, with standard cokes at corresponding prices.

Cleveland. Oct. 17.

Iron Ore.—The movement of ore down the lakes is somewhat retarded by the congested condition of the railroads in the northwest and along the south shore of Lake Erie. The rates of carriage remain unchanged, being based on 75c. from the head of the lakes.

Pig Iron.—Foundry iron is scarce, a number of the larger furnaces having withdrawn from the market for the time

being. The price holds firm at $15.50@$16 for spot delivery. The amount of iron for sale at the lower price is limited. The best grades of iron are held in some instances at $16.50 in the Valleys for No. 2. For bessemer present price is $15.50 to $16 in the Valleys.

Finished Material.—The mills having steel for sale are not willing to contract. Structural is still sold at a premium of $5 above the association in the mill yard. Most of the buying is either from stock or the Eastern mills. Billets are scarce; bessemer 4 by 4s have sold at $28 and in one instance the forging quality sold for $31, Pittsburg. Sheets are showing an improvement and pipe is also stronger. The whole market is exceedingly strong.

New York. Oct. 18.

Pig Iron.—Business has been active, and demand is strong. Several large sales are reported, for 1906 deliveries. Prices are firm, and there has been a notable advance in Southern iron of all kinds.

For Northern iron in large lots we quote: No. 1X foundry, $17.50@$18; No. 2X, $17@$17.50; No. 2 plain, $16.50@$17; gray forge, $15.50@$16. Basic iron has been in strong demand, and there is a sharp rise in prices. Northern is held at $17; Southern at $17@$17.50. Southern iron on dock is held at further advance, as follows: No. 1 foundry, $17.25@$17.75; No. 2, $16.75@$17.25; No. 3, $16.25@$16.75; No. 4, $15.75@$16.25; No. 1 soft, $17.50@$17.75; No. 2 soft, $16.75@$17.25; forge, $15.50@$16. No. 1 soft is again soft.

Little or no business is doing in warrants.

Cast - Iron Pipe.—Business continues good. Quotations are a little higher, $27.50 per net ton, carload lots at tidewater, for 6-in. pipe.

Bars.—Business is good. Iron bars are 1.745c., tidewater, for plain, and 1.795c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price. There is talk of higher prices.

Plates.—Steel plates are still scarce for early delivery. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width.

Structural Material.—Small orders continue to come in, and the mills will not guarantee deliveries. Prices are unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery.

Steel Rails.—No change in standard sections. Light rails are in demand and firm, prices ranging from $22.50 for 35-lb., up to $27.50 for 12-lb. rails.

Old Material.—Demand is strong, and prices are firm. No. 1 railroad wrought is $21@$22; No. 1 yard wrought, $18@$19.75; machinery cast, $13.75@$14.25; heavy steel melting scrap, $16@$16.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Oct. 18.

A quieter condition prevails in the pig-iron market this week, the most active being bessemer and basic pig, in which some business was done. There are inquiries for some small orders of basic which are intended to piece out certain work on hand. There are also a number of inquiries for special grades of foundry and a few small transactions closed, but it appears to be the opinion of the larger makers of iron that the rush is practically over. This view is not entertained by all. Quotations for No. 1X foundry are $18.25; No. 2X, $17.50; gray forge, $16; and basic, $17.

Steel Billets.—There has been quite a rush for steel billets, and some unexpected transactions have been closed for open-hearth. Quotations are given at $28.50 to $29.50 for ordinary open-hearth.

Bars.—The bar-iron market is quite active at advanced price.

Sheets.—A similar improvement is manifested in the sheet-iron branch, but it is largely among the smaller buyers.

Pipes and Tubes.—The tube market is very strong, and orders are being hurried into mills.

Plate.—The situation in the plate industry cannot be very clearly defined, because of the uncertain, but very large, amount of unplaced business. Representatives of mills say that they are not making satisfactory arrangements with all of their customers as to deliveries, but they are doing the best they can.

Structural Material.—Some very large orders have been given out by the Pennsylvania Railroad, involving the early placing of large contracts for construction material. Some erroneous announcements have heretofore been made concerning the placing of orders by that company, especially with reference to passenger cars. There is quite a number of small orders at present on the market for quickest possible delivery.

Steel Rails.—The activity in steel rails continues.

Scrap.—Our scrap people have been cleaned out of good scrap, and prices today are nominal. There is urgent demand for more material than can be promised, and the dealers are on the war-path for everything they can snatch up, especially railroad machinery scrap and No. 1 steel scrap.

Cartagena, Spain. Sept. 30.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were two cargoes, 6,900 tons dry ore, and one cargo, 3,100 tons manganiferous ore, all to Great Britain. The demand for iron and manganiferous ores for shipment over 1906 is even now considerably greater than the expected output from the mines of the district during the like period, so that merchants who have not already sold far ahead are to some extent holding back expecting a still further rise in prices. Mediterranean ore freights continue very firm, with but few boats in the market, and chartering is only being done when it is absolutely necessary to avoid breaking contracts with merchants or works.

Quotations are higher. Ordinary 50% ore is 6s. 8d.@7s.; special low phosphorus, 7s.@7s. 10d.; specular ore, 58% iron, 10s. 6d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

Dusseldorf, Germany. Oct. 10.

Exports of iron and steel from Germany this year have shown a considerable gain, having increased in all lines, though not in equal degree. Thus, in pig and semi-finished products the proportional gain was greater than in finished material. The exports for the eight months ending Aug. 31 are reported as below, in metric tons:

	1904.	1905.	Changes.
Pig iron	212 296	313,523	I. 101,226
Billets, blooms, etc	258,407	303,216	I. 44,809
Finis'd iron and steel	1,029,292	1,052,949	I. 23,657
Manufactures	364,500	395,127	I. 30,627
Machinery	172,547	193,035	I. 20,488
Total	2,037,042	2,257,849	I. 220,807

In this statement finished iron and steel includes bars, plates, sheets, etc., in forms ready for use; while manufacturers include material worked up into forms more or less complex, from such material.

Exports of slag and slag products were as follows, in metric tons:

	1904.	1905.	Changes.
Slag, slag wool, etc	23,974	17,496	D. 6,478
Thomas slag	153,387	149,629	D. 3,758
Total	177,361	167,125	D. 10,236

The Thomas, or basic, slag is used in the manufacture of fertilizers, on account of its phosphoric acid contents. The exports of this material were nearly balanced by the imports, as shown below.

Imports of iron and steel for the eight months are shown in the following table:

	1904.	1905.	Changes.
Pig iron	161,762	125,941	D. 35,821
Billets, blooms, etc	7,012	4,334	D. 2,678
Finis'd iron and steel	36,370	43,854	I. 7,484
Manufactures	30,458	33,914	I. 3,456
Machinery	52,653	55,390	I. 2,737
Total	288,255	263,433	D. 24,822

This shows a declining tendency in pig iron and semi-finished material; but increases in finished products. The classification is the same as in the table of exports.

Imports of slag and slag products were as follows, in metric tons:

	1904.	1905.	Changes.
Slag, slag wool, etc	576,940	591,297	I. 14,357
Thomas slag	103,860	149,021	I. 45,161
Total	680,800	740,318	I. 59,578

A large part of these imports were from Belgium.

Imports of iron ore were 4,137,711 metric tons in 1904, and 3,980,659 tons in 1905; showing a decrease of 157,052 tons, or 3.8% this year. Spain and Sweden furnished most of these imports.

The August output of the German blast-furnaces was 968,323 tons, the largest monthly production this year. For the eight months ending Aug. 31 the German Iron & Steel Union reports the production as follows, in metric tons:

	—1904.—		—1905.—	
	Tons.	Per ct.	Tons.	Per ct.
Foundry iron	1,196,043	17.8	1,210,159	17.3
Forge iron	552,895	8.2	530,802	7.6
Steel pig	406,122	6.1	435,820	6.2
Bessemer pig	287,615	4.3	280,980	4.0
Thomas pig	4,254,716	63.6	4,552,055	64.9
Total	6,697,391	100.0	7,009,816	100.0

Steel pig includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys. The gain in the total production was 312,425 tons, or 4.8%. There were moderate increases in foundry iron and steel pig, with decreases in forge and bessemer iron. The main increase—297,339 tons, or 7%—was in Thomas, or basic, pig, which is the staple German product, being nearly two-thirds of all the iron made.

Heavy Chemicals and Minerals.

NEW YORK, Oct. 18.

The market for heavy chemicals holds even, with general strength. American sulphur is firm on the basis of adjustment as outlined in the statement of a recent issue; we note herewith the prices for the American product, most of which is delivered at New York and Portland. Sicilian is quoted the same for Atlantic ports as the Louisiana sulphur.

Pyrite continues unchanged and in steady demand, the supply being practically disposed of for several months in advance.

Sulphate of copper holds steadily, with a very slight advance as noted.

Nitrate of soda reports firmer prices in the recent advances which are as noted herewith.

Phosphate companies report the same domestic quotations, with firm markets, and freights higher (one half-penny for foreign markets; indeed the higher foreign prices are almost entirely due to the advancing freights).

The English market reports a steady trade, with slightly higher demand and higher prices in some cases of heavy alkali products, as sulphate of ammonia and nitrate of soda.

PRICES.

Sulphur.	
Louisiana, N. Y., Boston or Portland, ton	$22.125
Philadelphia or Baltimore, "	22.625
Pyrite.	
Domestic, furnace size, Unit	11c
Fines, "	10c.
Imported, lump, At. ports, "	10@11c.
" fines " " "	9½@10c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.	
Boric, crystals, per lb.	.10
powdered, "	.10½
Carbonic, liquid gas, "	.12½
Hydrofluoric, 30%, "	.03
48%, "	.05
60%, "	.11
Nitric acid, 36°, 100 lb.	$4.75
38°, 100 lb.	5.25
40°, 100 lb.	5.50
42°, 100 lb.	5.75
Oxalic acid, com'l, 100 lb.	$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb. in carboys	1.05
60°, bulk, ton	18 00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk, ton	21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb.	$5.35
Nitrate of Soda, 100 lb.	2.25@ 2.30
Sulphate of Ammonia, per 100 lb.	3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.§
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr.	.....	11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C. §These figures are slightly higher owing to the advance (one half-penny) in freight.

Metal Market.

New York, Oct 11.

Gold and Silver Exports and Imports.

At all United States Ports in Sept. and Year.

Metal.	September		Year.	
	1904.	1905.	1904.	1905.
Gold Exp	$2,744,448	$1,412,904	$83,039,988	$42,677,921
Imp	4,241,035	5,499,685	68,694,670	30,295,595
Exc	E. $1,496,587	I. $4,086,781	E.$14,345,238	E$12,382,326
Silv. Exp	3,378,775	5,527,479	39,129,920	39,443,219
Imp	2,003,036	3,803,840	19,677,231	24,470,838
Exc	E. $1,375,739	E. $1,723,619	E.$19,452,689	$14,972,377

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce of Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending October 7, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$5,375	$3,806,796	$572,359	$69,038
1905	32,297,368	9,642,156	27,601,096	3,674,599
1904	73,177,464	4,940,934	30,331,733	798,923
1903	31,438,290	6,609,994	23,384,536	3,075,090

Exports of gold for the week were to Haiti; of silver chiefly to Great Britain. Imports of gold for the week were from Great Britain and Germany; of silver from Mexico and Central America.

The foreign merchandise trade of the United States for the nine months ending Sept. 30 is stated by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904	1805
Exports	$985,468,881	$1,102,575,831
Imports	751,394,339	872,548,988
Excess exports	$234,074,542	$230,026,843
Add excess of exports silver		14,972,377
" " " gold		12,382,326
Total export balance		$257,381,546

The gold and silver movement in detail will be found in the tables at the head of this column.

Business of all kinds is active, and demand for materials is strong in almost every line. The stock exchanges are disturbed by high rates for money, which are chiefly due to the great trade activity.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Oct. 14 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,134,013,400	$1,030,284,300
Deposits	1,193,237,700	1,026,157,600
Circulation	42,288,000	54,155,800
Specie	237,745,000	191,952,100
Legal tenders	76,522,300	74,798,700
Total reserve	$314,267,300	$266,750,800
Legal requirements	298,309,425	256,539,400
Balance surplus	$15,957,875	$10,211,400

Changes for the week this year were increases of $735,500 in legal tenders, $13,400 in circulation and $5,925,225 in surplus reserve; decreases of $3,086,300 in specie, $33,104,100 in deposits and $29,456,600 in loans.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$191,952,100	.....
England	157,153,520	.....
France	584,734,435	$220,526,410
Germany	141,545,000	47,195,000
Spain	74,780,000	111,905,000
Netherlands	32,991,500	29,715,000
Belgium	16,420,000	8,210,000
Italy	123,895,000	16,118,500
Russia	574,660,000	26,255,000
Austria	227,870,000	60,605,000

The returns of the Associated Banks of New York are of date Oct. 14, and the others Oct. 13. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Oct. 5 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£7,749,498	£4,603,821	D. £3,145,677
China	372,722	758,688	I. 385,966
Straits	58,103	38,299	D. 19,804
Totals	£8,185,323	£5,400,808	D. £2,779,515

Exports for the week were £132,750 in bars and £15,750 in Mexican dollars to India, and £26,624 to China; a total of £175,124. Receipts were £2,000 from the West Indies, £10,000 from New Zealand and £222,000 from New York; £234,000 in all.

Indian exchange is firm, notwithstanding the fact that a good deal of gold is going from Australia to India. The Council bills offered in London were all taken at an average of 16.04d. per rupee.

SILVER AND STERLING EXCHANGE.

Octt.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
12	4.85⅝	61⅞	28⅛	16	4.8555	62	28⅛
13	4.85⅝	61⅞	28⅛	17	4.8575	62⅛	28 1/16
14	4.85⅝	61⅞	28 7/16	18	4.8575	62⅛	28 1/16

New York quotations are for fine silver, per ounce, Troy. London prices are for sterling silver, .925 fine.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.47	$0.49
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

October.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
12	16 @16⅛	16 @16½	70⅞	32⅛	4.85	6.00 @6.05	5.85 @5.90
13	16 @16⅛	16 @16½	71⅛	32⅛	4.85	6.05	5.90
14	16 @16⅛	16 @16⅛	....	32⅛	4.85	6.05	5.90
16	16¼ @16⅜	16¼ @16½	71⅛	32⅜	4.85	6.10	5.95
17	16¼ @16⅜	16¼ @16⅜	72	32½	4.85	6.15	6.00
18	16¼ @16½	16¼ @16½	72⅛	32⅝	4.85	6.15	6.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—There has been no change in the situation, as far as the home market is concerned. Consumers are content to leave well enough alone, and on this account very little business has been done for home trade. During the last few days, however, there has been a revival of inquiry for export, which promises to again assume very large proportions, in which event it is bound to have a favorable effect upon prices before long. The market closes today at 16¼@16½c. for Lake and electrolytic copper; 15⅝@16⅛c. for casting copper.

Owing to bear coverings, there was a sharp advance in the standard market in London, particularly in spot, which seems to be particularly cornered, on account of the limited supplies. The quotations at the close are £72 10s. for spot, and £71 for three months.

Statistics for the first half of October show a decrease in the visible supplies of 1,000 tons.

Refined and manufactured sorts, we quote: English tough, £75; best selected, £76; strong sheets, £84; India sheets, £79; yellow metal, 7⅛d.

Tin.—There has been a very heavy business doing at advancing prices, owing to a decided improvement in the demand, and we quote, at the close, 32½@32¾c., depending upon deliveries.

The situation here is, as usual, only a reflection of the happenings in London, where the price reached £149 for spot, £148 10s. for three months, while the close is slightly lower at £148 17s. 6d. for spot, and £148 5s. for three months.

Lead.—There does not seem to be any spot lead available, and the market is altogether confined to shipment lead, which is quoted 4.85c. New York and 4.77½c. St. Louis.

The London market is again higher, and closes strong at £14 18s. 9d. for Spanish lead, £15 1s. 3d. for English lead.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Sept. 30, that silver has been 14.75 reales per ounce; exchange, 32.86 pesetas to £1. Local price for pig lead has been 75 reales per quintal, equal, on current exchange, to £12 15s. 5d. per long ton, f. o. b. Cartagena. Exports for the week were 1,039 tons desilverized to London; 339 tons argentiferous and 150 desilverized lead to Marseilles.

Spelter.—It is reported that considerable business has been done for shipment to Europe, and this report is credited by those who are in a position to know, in view of the fact that the market abroad has caught up with the prices ruling for home trade. Under this stimulus, prices have advanced to 6.15 New York, 6c. St. Louis, and if Europe continues to draw upon the domestic supplies, higher prices are bound to rule.

The close in London is firm at £28 12s. 6d. for good ordinaries, £28 17s. 6d. for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is on the boom. Latest sales here are on a basis of 6c. for both prompt and future delivery, with every prospect of higher prices in the near future.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 30, that, with the continued rise in spelter, the local quotations for raw calamine ores have advanced considerably. Blende prices in the sierra are also firmer, but the advance in the latter is not nearly so strong as that in calamine. The latest quotations are 95 fr. for blende, 35% zinc, and 72 fr. for calamine, 30% zinc.

Zinc Sheets.—Sheet zinc is quoted at $7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50. The demand is reported active.

Antimony.—There is no change from last week's position.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Manganese Alloys.—Prices have been raised, on account of the advances in copper and tin. The present quotations for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	400
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum.	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	40c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Oct. 14.

The highest price reported for zinc ore was $53 per ton, with the assay basis at $48@50 per ton of 60% zinc, a decline of $2 per ton on practically all grades. A further cut in prices is announced for next week by the purchasing agents, notwithstanding the fact that a large number of producers declined to accept the lower prices of this week. By refusal to sell, the shipment was decreased 1,080 tons, and the stock in the bins was increased approximately 900 tons. The output is the largest since the July floods, a little larger than it was before the heavy inflow of water, and all the mines are outputting at their best, with fine autumn weather favoring the miners. It appears that the smelters still buying ore intend to profit as much as possible from this season of heavy output.

Lead prices were advanced $1 per ton, the choicest grades selling at $64.50, and 80% grades at $64 per ton.

The average price of all grades of zinc ore for the week was $45.08, against $47.20 the previous week. The average price of lead ore was $63.62, against $62.72 last week.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,067,040	253,450	$81,710
Carterville-Webb City	1,514,700	460,020	48,800
Galena-Empire	915,580	169,540	25,570
Duenweg	496,620	131,360	15,370
Aurora	784,480	.....	11,650
Oronogo	413,660	.....	10,700
Alba	293,960	56,300	9,140
Badger	338,580	.....	7,780
Carthage	228,060	.....	5,710
Spurgeon	180,760	3,480	3,690
Central City	116,380	.....	2,600
Prosperity	64,910	32,500	2,490
Reeds	72,150	.....	1,660
Neck City	65,500	.....	1,640
Beef Branch	37,090	24,960	1,110
Sarcoxie	43,460	.....	1,000
Totals	8,632,950	1,131,610	$230,630
41 weeks	395,890,320	48,482,300	$10,312,985
Zinc value, the week, $194,620; 41 weeks			$8,875,175
Lead value, the week, 36,010; 41 weeks			1,437,810

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61.50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July.	53.00	58.00
August.	37.55	48.83	August.	53.00	58.00
September.	40.18	46.75	September.	53.50	63.50

Wisconsin Ore Market.

PLATTEVILLE, Oct. 13.

The price of zinc ore, much to the satisfaction of the producers, stiffened up materially during the past week. An advance of from $1 to $2 was offered for 60% ore over last week's prices. The producers of high-grade ore did not sell, but are holding for better prices. Several small lots of hand-cobbed zinc ore selling at $53@$54.

The price of lead ore remains stationary, supply being all taken up. The Dall Mining Co. loaded several carloads, which were shipped to new buyers in the East, which fact helped to hold up the prices.

Mining Stocks.

New York. Oct. 18.

Speculation is regulated just now largely by the supply of money. High rates are the rule, and this keeps down transactions. The copper stocks have been strong. Amalgamated touched $86, but closed at $85⅜. There is a good deal of speculation about the quarterly dividend, the declaration of which is due in a day or two. United Copper has declared the usual dividend on the preferred stock. British Columbia copper closed at $8⅞; Granby at $8¾; Tennessee at $34; Utah Copper at $26½. United Copper sold at $33¾ for the common and $75½ for the preferred.

On the Consolidated Exchange there were the usual small dealings in Comstock and Colorado shares, but no special interest was shown.

Boston. Oct. 17.

There has been a good, strong copper share market here the last week, with a plentiful amount of profit-taking, yet the undertone is good with a prospect that much higher prices will soon be realized. For a day or two last week, following the Vanderlip speech, prices sagged, but this was soon forgotten and, notwithstanding the firm money market, public interest in this class of stocks is increasing. There has been a good request outside of this center, notably from New York, Pittsburg, Chicago, Duluth and the Lake district, which has made up for the lack of interest locally.

Allouez has been the star feature, rising from $41.62½ a week back to $49 today. Many rumors have been current, notwithstanding the property is showing wonderful results. It is known that the rock is running close to 57 lb. of mineral to the ton of rock stamped, which is better than 2.8 lb. It has been reported that J. W. Gates has been a large buyer of this as well as other copper stocks, but it is not believed that he has gained control of Allouez, althought it is believed that somebody is looking to this end. The stock has certainly become scarce.

Boston Consolidated took a sudden spurt Friday of last week, and has been an active feature since. From a close at $9.50 a week back it touched $12.87½ Monday, closing at $12 tonight, with over 38,000 shares traded in the last four days. American Smelting interests are reported as large purchasers of late. Old Dominion rose from $27 to $28.87½ on buying by a single house, and Centennial rose $2.50 to $30.75. Franklin, after settling to $17.37½, rallied to $20. Isle Royale fell $1.62½ to $23.50, but rose to $27, closing $1 below this tonight.

Mohawk is up $2.50 to $60, and Osceola $4.50 to $112. Quincy has advanced $5.62½ to $109.62½, Tamarack $5 to $130 and Wolverine $3 to $122. Trinity started in today and rose $1 to $11, but lost it. Utah rose $1.62½ to $48, and United States $1.62½ to $37.75. North Butte made a $4 advance to $57 on Western orders, closing $1 under this. Greene is up $1.87½ to $27.87½, and Michigan $1.12½ to $15.62½. Parrot on small trading has advanced $2.37 to $28.87½. Amalgamated on increased dividend prospects touched $86.25 today. Adventure touched $9.62½ today; Bingham, $32.50 Monday; Copper Range, $73.12½; Granby, $8.87½ today; Shannon, $9, and Tecumseh, $9. Calumet & Hecla interests deny having bought any Tecumseh stock or having any interest in its lands. Utah Copper rose to $26.25 on the local curb.

Colorado Springs. Oct. 12.

The local mining market has been considerably stronger during the past week, and the demand for stocks was quite well distributed throughout the list, with prices somewhat in advance of last week's quotations.

El Paso, which has been the sensation of the Colorado Springs market for some time, took another tumble and landed at 62c., but has since recovered and sold to-day for 69⅝c. Acacia has gained about 1½c. and sold to-day for 125⅛c. Anaconda has been quite inactive and sold down to 13½c. Elkton has made an advance of a fraction, selling for 54½c. Findley made a decided gain, advancing from 74¼ to 81c. Isabella has shaded off on a sale at 26c. Portland has been selling ex-dividend at $2.20. Independence is selling at 10½c. per share.

San Francisco. Oct. 12.

The Comstock shares have been quiet, with rather a weak tendency. Buying orders have been scarce. Ophir sold around $5.50; Consolidated California & Virginia, $1.30; Hale & Norcross, $1.05 per share.

The Tonopah and Goldfields stocks were active, with a very good demand. Sales were numerous and prices rather strong. Tonopah Extension, sold at $6; Tonopah Belmont, $1.45; Jim Butler, 68c. per share.

Oil stocks were quiet and rather weak. California Standard was quoted at 42c.; Independence, 25c. per share.

The sworn returns of the mining companies, as filed in their offices this week, show cash on hand Oct. 1, as noted, with all expenses paid, unless otherwise stated: Alta, $901; Alpha Consolidated, $2,774;

Andes, $5,763; Belcher, $7,000, with September expenses partly unpaid; Bullion, $4,051; Best & Belcher, $2,181; Caledonia, $5,761, with September expenses unpaid; Consolidated Californa & Virginia, $27,424; Confidence, $1,692; Challar, $2,078; Crown Point, $1,651; Challenge Consolidated, $1,175; Consolidated Imperial, $2,988; Exchequer, $596; Gould & Curry, $5,142, with bills receivable of $390; Hale & Norcross, $212, with indebtedness of $2,000; Julia Consolidated, $1,338; Justice, $233, with bills payable of $278; Mexico, $245; Consolidated New York, $80; Ophir, $29,067; Potosi, $4,755; Savage, $244; Segregated Belcher, $27; Sierra Nevada, $236; Silver Hill, $19,173; Scorpion, $1,399; Standard Consolidated, $50,511, with September expenses and September clean-up to be accounted for; Syndicate, $17; Union Consolidated, $648; Utah Consolidated, $2, with $3,000 indebtedness.

Dividends.

Company.	Payable.	Rate.	Amt.
Copper Range		$1.50	$150,000
El Paso	Oct. 25	0.01	24,000
Green Con. Copper	Oct. 30	0.40	345,600
Le Roe No. 2	Oct. 30	0.24	28,800
N. Y. & Honduras Rosario	Oct. 21	0.15	22,500
Philadelphia Co	Nov. 1	0.75	434,295
Rocco-Homestake	Oct. 25	0.02	6,000
St. Eugene Con	Oct. 30	0.02	64,040
Tenn. Coal Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, Iron & R. R., pf.	Nov. 1	2.00	4,960
Tonopah, of Nev.	Oct. 10	0.25	250,000
Tonopah Extension	Oct. 10	0.10	100,000
U. S. Cast Iron Pipe & Fdy.	Dec. 1	1.00	125,000
Vindicator		0.03	33,000
Vulcan De-tinning, pf.	Oct. 20	1.25	18,750
United Copper, pfd	Nov. 15	3.00	150,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Confidence	Nov. 12	Dec. 4	0.20
Con. Imperial	Oct. 2	Oct. 26	0.01
Drinkwater, Cal			0.04
Dudley, Cal	Oct. 30		0.01
Exchequer	Oct. 10	Oct. 31	0.05
Hale & Norcross	Nov. 2	Nov. 28	0.10
Mexican	Oct. 30	Nov. 20	0.15
Savage	Nov. 8	Nov. 29	0.10
Sierra Nevada	Nov. 2	Nov. 23	0.10
Union Con	Nov. 13	Dec. 4	0.10
Utah Con., Nevada	Oct. 31	Nov. 21	0.05
Yellow Jacket	Oct. 17	Nov. 22	0.10

St. Louis.

Oct. 14.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.09	.07
Center Creek	2.00	1.50
Central Coal & Coke	64.75	63.50
" " " pfd.	81.00	79.50
Columbia	1.00	.25
Con. Coal	30.00	29.00
Doe Run	141.00	138.50
Granite Bimetallic	.20	.15
St. Joe	16.50	15.00

LONDON. (*By Cable.**) Oct. 17.

	£	s.	d.
Camp Bird	1	18	4½
Consolidated Gold Fields	6	2	6
De Beers	17	17	6
Dolores	2	1	3
East Rand	7	0	7½
El Oro	1	19	4½
Esperanza	5	15	0
Modderfontein	8	6	3
Rand Mines	8	2	6
Rio Tinto	66	10	0
Simmer and Jack	1	10	7½
Stratton's Independence	0	10	0
Tomboy	1	11	3

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Oct. 11.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	86⅜	83½	85⅜	175,070
Anaconda	122	115⅜	120	5,500
British Col. Copper	9⅛	8	8⅝	6,664
Federal	123½	119	123⅛	1,300
Federal, Pf.	98¾	96	97¾	3,303
Greene Copper	28	26⅛	27¾	33,300
Greene Gold	5⅛	4⅜	5	19,130
Mitchell	9¾	8⅜	8⅝	13,300
Tennessee Copper	36⅞	33½	35	2,100
Union Copper	1⅞	1⅜	1⅛	2,800
United Copper	34½	33½	34	7,200
United Copper, Pref.	76	75	76	2,385
White Knob	⅞	⅝	⅝	1 175

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	129⅝	126⅛	127⅛	92,500
Am. Smelting & Ref., Pf.	122½	120½	121¾	1,600
Colorado Fuel & Iron	47¾	44½	45½	20,679
National Lead	47¾	45¼	47⅛	8,900
Pittsburg Coal	15¼	15⅛	15¼	900
Republic I. & S.	26¾	23¾	25⅝	40,350
Republic I. & S., Pf	96½	92¾	95	16,800
U. S. Red. & Ref.	29	29	29	200
U. S. Red. & Ref., Pf.	65⅝	65	65	300
U. S. Steel	38⅝	37	37¾	229,485
U. S. Steel, Pf.	105	103½	104½	70,000
Bethlehem Steel	30	29½	28½	1,300
Standard Oil	675	667	673	246

BOSTON.

Allouez	49	40¾	48¼	29,534
Amalgamated	86⅛	83¼	85⅛	14,502
Atlantic	28¼	26½	27	5,827
Bingham	32½	30⅛	32½	6,340
Boston Consolidated	12⅞	9⅛	12	43,672
Calumet & Hecla	670	660	670	85
§Centennial	30¾	27¼	30	15,498
Mercur	.60	.57	.57	2,515
Copper Range	73⅛	70¼	72⅛	8,948
Daly-West	14⅜	14	14½	1,010
Franklin	20⅛	17¼	19⅜	15,704
Granby	8⅞	7¾	8¾	12,340
Green Con. Copper	27⅞	26	27⅞	23,223
Isle Royale	27	23⅜	26	11,030
‡Mass	10¾	9¾	10½	2,730
Michigan	15¾	14	15⅜	7,313
Mohawk	60¼	57	60	3,989
*North Butte	57	52⅞	56	16,157
Old Dominion	28⅞	27	28¼	14,846
*Osceola	112	107	111	5,792
*Parrot	28½	26	28	2,135
Phoenix	1¾	1¼	1¾	3,595
Quincy	109⅝	104	109	457
Rhode Island	8¼	7	8⅛	6,979
Shannon	9	7⅞	8⅛	16,525
Tamarack	130	125	130	340
Tecumseh	14¾	12¾	14	7,888
United Copper, com	34¼	33⅜	34	3,575
United States	37¾	35⅞	36¾	9,969
Utah	48	46	47½	5,818
Wolverine	122	119	122	453

PHILADELPHIA.

Cambria Steel	29	28¾	28¾	1,262
Philadelphia Co	49	48¾	48⅜	12,321
Tonopah	13¼	13	12⅝	2,020

PITTSBURG.

Crucible Steel	13¾	12¾	13⅛	6,295
Crucible Steel, Pref.	67⅞	66	66⅞	1,575
Tonopah Ext	6.00	6.00	6.00	3,750

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	53	54⅜	53	54⅛
El Paso	65	72	65	72
Isabella	26⅛	26½	24	25
Portland	215	215	210	210
Vindicator	71	81	71	81

SAN FRANCISCO.

Best & Belcher	1.15	1.25	1.15	1.15
Bullion	.37	.38	.37	.38
Caledonia	.47	.46	.42	.43
Confidence	.69	.77	.69	.77
Con. Cal. & Va	1.30	1.60	1.30	1.60
Gould & Curry	.19	.22	.19	.22
Hale & Norcross	1.15	1.20	1.10	1.20
Mexican	1.05	1.10	1.05	1.10
Occidental Con	.87	.87	.87	.87
Ophir	5.37½	5.62½	5.37½	5.62½
Savage	.49	.50	.47	.50

*Ex-dividend. †1st Instalment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.490	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct.	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar.	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum, N. C	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	sh ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01 3-5@.02
Italian, powdered	"	.01½@.01⅝
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Chrome Alum	lb.	0.05
ALUMINUM—Sulphate, com'l.	"	75@1.25
AMMONIUM—		
Bromide	lb.	.22
Carbonate	"	.08
Muriate grain	"	.05½@.05⅞
Lump	"	.09½
Sulphocyanide com.	"	.25
" " chem. pure	"	.35
ARSENIC—White	"	.02¾@.03
Red Silesian	"	.07½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@96%	"	28.00@29.00
Powdered 80@90%	lb.	.01¾@.02
Chloride com'l	1000 lb.	25.00
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.06
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No 1	sh. ton.	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	20.00
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Arkansas, first grade	lg.	5 00@5.50
Second grade	"	4.50@4.75
Washed ore	"	6.00@7.00
BONE ASH	lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.30
Acetate, brown	"	1.55
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	1.25@1.75
"Rosendale" 300 lb	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHLORINE—Liquid,		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	18.50@19.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	7.75@8.00
Am. best ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best	"	16.75
COBALT—Oxide	lb.	2.60
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.52½
CRYOLITE	lb.	.06½
EXPLOSIVES—		
Blasting powder, A	.25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11@.11½
FELDSPAR—Ground	sh. ton.	9.75@10.00
FIRE BRICK.		
American	per M.	20.00@30.00
Imported	"	30.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
American, ore, common	lb.	.02@.04
Artificial	"	.06½
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton.	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09½
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
" granular	"	.08½
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	6.50@7.00
Calcined	sh. ton.	16.50@17.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01¾
Sulphate	100 lb.	.50@1.25
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02
85@90% binoxide	"	.02½@.03
90@95% binoxide	"	.03½@.05½
Ore	unit.	.18@.20
MARBLE—Flour	sh. ton.	6.00@7.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide	lb.	.10
NICKEL—		
Oxide, crude, 100 lb. (at 55 for fine metal contained		.35@.40
Sulphate, single	100 lb,	.22@.25
" double	"	.13@.15
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06½
English glassmakers'	"	.08½@.08⅝
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01⅞
Paris green, pure, bulk	"	.12
Red lead, American	"	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.64
White lead, Am., dry	lb.	.05½@.05½
American, in oil	"	.06½@.06½
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate crystal	lb.	$0 08½
Powdered or granulated	"	.14
Bichromate, Am	"	.08½@.08¾
Scotch	"	.08½@.08⅞
Bromide	"	.15
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08½
Crystals	"	.08½@.08⅝
Cyanide (98@99%)	"	.18½@.19
Kainit (bulk)	lg. ton.	8.50
Manure salt 20%	"	14.75@15.75
Double Manure Salt, 48@53%	100 lb.	1.16½@1.19½
Muriate	" "	1.90@1.95
Permanganate	lb.	.09½@.09½
Prussiate, yellow	"	.13½@.13½
Red	"	.35
Sulphate	100 lb.	2.18½@2.21½
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton.	4.40
SALTPETER—Crude	100 lb.	4.00@4.25
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.36½
SODIUM—		
Acetate	lb.	0.04¼
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06⅞
Bromide	"	.20
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 60@78%, f.o.b., works	"	1.75@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.08½@.08½
Cyanide, ("100% KCN")	"	.18½@.19
Hyposulphite, Am	"	1.50@1.60
German	"	1.75@2.00
Phosphate	lb.	.02½@.02½
Prussiate	"	.09½@.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.85
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
SULPHUR—Best seconds, per ton,		21.00
Roll	100 lb.	1.85
Flour	" "	1.90
Flowers, sublimed	" "	2.20
TALC—North Carolina	sh. ton.	15.50@23.50
N. Y. Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.40
TIN—Bi-chloride, 45%	lb	.09¼
Crystals	"	.22
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½
Chloride, granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CERIUM—Oxalate	oz.	.35
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
TANTALUM—Acid	oz.	.40
Ore, 20% acid	lb.	.20
" 70% "	"	3.50
THORIUM—Nit. 49@50%	"	12.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	10.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.